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Contractors and Engineers Monthly

Vol. 45, No. 12

DECEMBER, 1948

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Bridges Pose Problems

Contractor rigs up cableway and facilitates bridge construction. Page 1 carries the story of a bridge with a history. Specifications were a challenge on an overpass job. Page 91 tells you how they were tackled.

Airport of Native Chat

A blend of chat, portland cement, and water makes up the base of the Joplin, Mo., airport runway. The article is on page 1.

Road Relocated

Dangerous curves on the Norwich-Groton, Conn., road are eliminated by relocation. This page brings you the details.

Port Enlarged for Ore Boats

At Two Harbors, Minn., harbor changes entail construction of breakwater, rubble mound, etc. The account is on page 2.

Water Tunnel Through Rock

Baltimore's need is more water. Read, on page 5, and see, on pages 50 and 51, just what is being done about it.

Dredging for Bridge Approaches

Approach embankments for a new Florida bridge were built by dredge. For the story, see page 17.

You Can Plan for Safety

The National Safety Congress discusses for you the need of planning for safety on the job. Page 23 has the story.

Plant-Mix Maintains County Road

Jefferson County, Ind., supervisor tells of his county's experience with plant-mix resurfacing. His report is on page 35.

Building the Modern Way

Time-saving prefabricating methods beat winter to the draw. Read of one building contractor's initiative on page 38.

Concrete Road With Future

Formed keyways on portland-cement-concrete highway allow for future road widening. Page 43 brings the story to you.

Michigan vs. Winter

Michigan, backed by her new snow-removal units, challenges winter. The account of a well-prepared state is on page 48.

Black-Top Mix for Two Jobs

Old highway is widened and surfaced with asphaltic concrete. See page 53.

Turn to page 63 for details of road-building on Georgia's interesting Jekyll Island.

Huge Earth Dam Job Under Way

The crew calls it "routine". But Garrison Dam, 70,000,000 cubic yards of it, seems anything but. See page 59.

Concrete Walls Protect Cities

Fear of floods is obliterated by construction of concrete floodwalls along banks of river. You can read of it on page 70.

Crushed-Limestone Road Base

Contract calls for crushing and laying of 250,000 cubic yards of limestone for 22½-mile job. See page 76.
(You will find "In This Issue" on page 4)



C. & E. M. Photo
You're looking north along the cableway John H. Moon rigged up for his bridge job. A tool box, hooked to the concrete hopper, moves along the line.

Road Relocation Removes Curves

Goes Through Rock Instead Of Around It, As Another Section of Macadam Near Naval Base Is Rebuilt

THE Connecticut State Highway Department has reconstructed another stretch of State Route 12, the Norwich-Groton Road, which runs along the east bank of the Thames River. This important 2-mile section near Gales Ferry, in the Town of Ledyard, serves the U. S. Submarine Base located on the river just north of U. S. 1. The Highway Department has been active on this heavily traveled road, straightening the alignment, and constructing wider and more durable roadways in a series of short contracts. The latest job got under way in May, 1947, and was completed

(Continued on page 12)

Joplin Chat and Cement Used to Build Airport Base

Mine-Run Joplin Chat Is Stabilized With Cement To Make the Base for New Runway and Taxiways

FIVE miles north of Joplin, Mo., Tri-State Construction Co. of Joplin blended mine-run chat, portland cement, and water in a Wood Roadmixer to form the base of a new runway and taxiways on the local airport. The work was done under a \$241,000 contract, and was financed jointly by the City of Joplin and the Civil Aeronautics Administration.

The job, which began late in the fall of 1947, was scheduled for completion by the end of last July, and the enlarged Joplin airport is now better able to accommodate the present 16 commercial flights of American Airlines and Mid-Continent Airlines planes which cur-

Cableway Features 875-Foot-Bridge Job

A NEW 875-foot steel-and-concrete bridge has been constructed over Bayou Pierre on U. S. 61, just north of Port Gibson, Miss. It consists of a three-span steel cantilever, with two spans of 100 feet each and the center span of 175 feet, plus ten steel I-beam spans of 50 feet each. Of the smaller spans, two are south of the cantilever portion of the structure; the others are to the north. Four reinforced-concrete piers support the cantilever spans. The other spans rest on bents consisting of five steel H-beam piles topped by a concrete cap. A concrete deck slab provides a 28-foot roadway, flanked on each side by a 5-foot sidewalk.

The Mississippi State Highway Department awarded a contract for the work to John H. Moon, a Port Gibson, Miss., contractor, on his low bid of \$364,000. Work on the structure started in May, 1947, and the bridge was completed in September, 1948. A somewhat unusual feature of the job was the cableway which the contractor strung up lengthwise of the bridge after the substructure was completed. With this rigging he handled and set the lighter structural-steel members in the 50-foot spans, and also transported concrete in buckets from the mixer on the bank to the forms for the deck slabs.

Historic Site

This job site on the Port Gibson-Vicksburg highway in Claiborne County is only about 10 miles east of the Mississippi River into which Bayou Pierre empties. The original structure at this site was a suspension bridge built many years ago by slave labor. It consisted of wrought-iron cables made up of material imported from Sweden. And it was unique in that the

Handles Lighter Steel Members in Superstructure And Concrete Bucket for Pouring Deck Slabs

cables were forged on the job by the slaves, and were composed of 28 layers of steel bands ¼ inch thick x 4 inches wide, laid flatwise so as to produce a 4 x 7-inch cable.

During the War Between the States, this original bridge played a part in the campaign that preceded the siege of Vicksburg. Grant with his Union armies had crossed the Mississippi from Louisiana at a point below Port Gibson, and begun a drive north to Vicksburg. A small force of Confederate soldiers burned out the flooring of this strategically located bridge across the bayou, thereby retarding the Union push and giving Lieut. Gen. John C. Pemberton, in command of the Confederates at Vicksburg, more time to prepare the defenses of the city.

After the War the bridge was repaired, and it remained in service until 1926. Then it was replaced by a new bridge located about 750 feet west of the present-day structure. This second bridge consisted of a steel-truss span over the bayou, and a long timber trestle on the north approach. The truss rested on concrete piers supported on timber bearing piles. Its roadway was 20 feet wide, but there was a sharp curve on U. S. 61 in order to gain the south approach of the bridge, and its carrying capacity was too light for present-day loads.

The new bridge is on entirely new location, thereby eliminating the dangerous curve at the south approach of the old bridge. Its H15-S12 design load is ample, and the 28-foot roadway is plenty wide for safety. Beyond the bridge on the north, an approach embankment ties back in to the main highway.

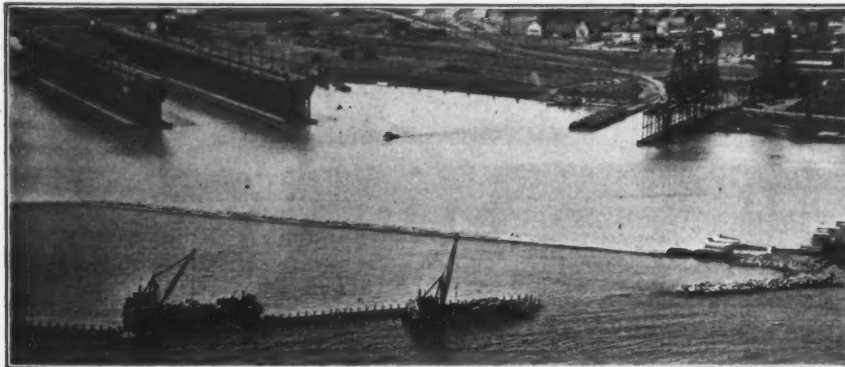
Reinforced-Concrete Piers

The reinforced-concrete piers, numbered from 1 to 4 beginning on the south side, are all anchored from 4½ to 5 feet in rock. Pier 2, in fact, on the left bank of the bayou, goes down nearly 12 feet into rock. Piers 2 and 3 were begun first in order to get them completed during the 1947 summer when the water was low, since they are

(Continued on page 85)



Photo by Wallace Kane
This overall view of base work at Joplin Airport shows a Wood Roadmixer processing a section of runway, and some of Tri-State Construction Co.'s finishing equipment.



Rock-Filled Cribs In Big Breakwater

**Modification of Harbor
At Northern Ore Port
Calls for Breakwater
Cribs and Rubble Mound**

By **RAYMOND P. DAY**,
Western Editor

† **CONSTRUCTION** of a rubble mound and 5 of an ultimate 13 timber cribs, together with demolition of the existing breakwater, made up the 1948 work schedule at the iron-ore port of Two Harbors, Minn. There, under a \$2,500,000 contract with the Duluth District Office of the Corps of Engineers, Zenith Dredge Co. of Duluth is enlarging the harbor to make it easier for the long ore boats to maneuver.

The Zenith Dredge Co. contract includes construction of a new east breakwater, removal of the old structure, and dredging for the enlargement of the harbor. Dredging and the production of quarry stone have been detailed in a previous issue of this magazine. (See

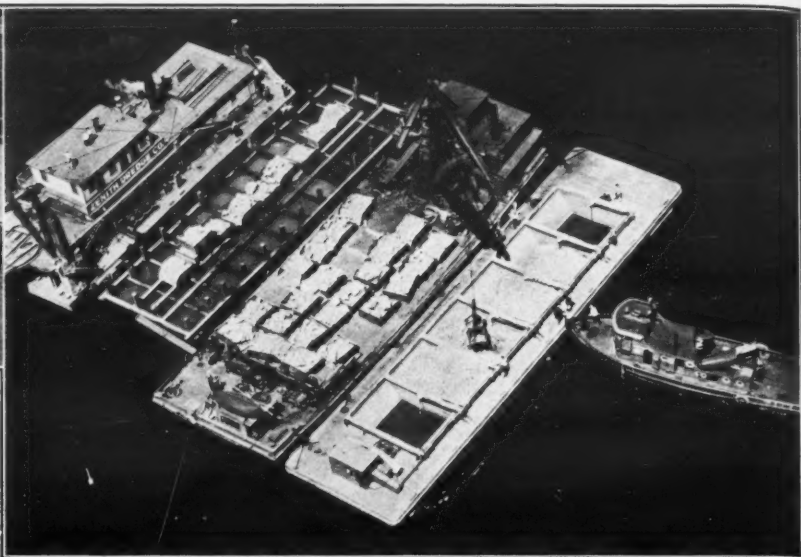
C. & E. M., April, 1948, pg. 2.)

When Two Harbors began to be used as an ore port, ore freighters were much smaller than today's 18,000-ton-capacity freighters. The big multi-million-dollar ore docks were originally built to accommodate these smaller craft. When they were made longer to accommodate bigger boats, maneuvering space decreased alarmingly, and the need for a larger harbor was evident.

The new breakwater is to be 1,628.48 feet in length. This figure includes a rubble-mound shore connection 326.25 feet long. The shore connection will have a 12-foot-wide crest, with uniform 1½ to 1 side slopes, and the top of rock on this section is located 6 feet above low-water datum.

The crib section of the breakwater ends in water 75 feet deep. This section is composed of a rubble mound 50 feet wide at the top, with 1½ to 1 side slopes, with the top of the heavy cover stone at a point 18 feet below low-water datum. (Low-water datum at Two Harbors is at elevation 601.6.) Centered on the top

1. Two derrick boats, Faith and Powerful, load skips of breakwater rock at the job dock in Two Harbors. 2. This is an inside view of the timber cribs which J. D. Harrold Co. constructed. Fir timbers 12 x 12 inches will close up the sides and inner cells. 3. Here the derrick boat Powerful dumps skips of rock into the timber cribs to make them stable. 4. And here is a general view of the cribs sunk along the breakwater line. C. & E. M. Photos



Zenith Dredge Co. Photos

These aerial views show timber crib placing at the iron-ore port of Two Harbors, Minn. The old breakwater, capped with reinforced concrete, shows up clearly in the photo at left. Above, the first crib is brought in alongside Zenith Dredge Co.'s dipper dredge No. 27 to be sunk to exact alignment.

of this mound of stone are 13 timber cribs, each 30 feet wide, 29 feet high, and 100 feet long. The bottom of each timber crib rests 23 feet below low-water datum, and heavy cover stone extends 5 feet up along the side of each crib. The tops of the cribs are 6 feet higher than low-water datum—or at elevation 607.6.

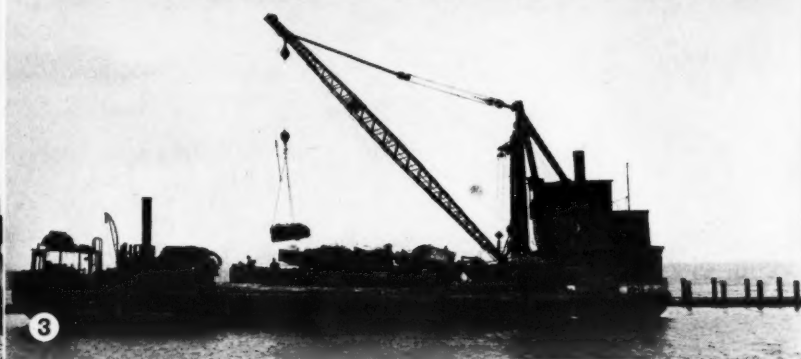
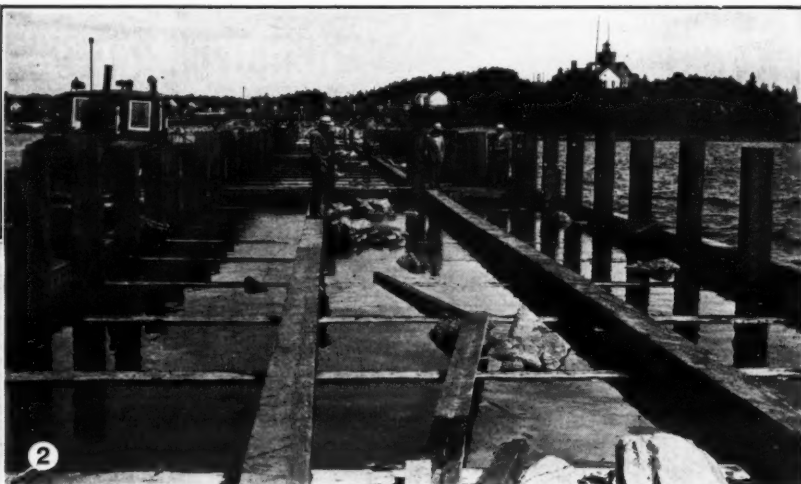
Completed, the cribs will be filled with rock, and a 48-inch metal ice-guard plate will prevent damage when winter ice grinds against the structure. The new breakwater is being built about 800 feet south of the existing structure.

The 1948 working schedule called for the construction and placement of 5 of the 13 cribs. The next two years—1949 and 1950—should see four cribs built and placed each year, to complete the job at the end of the 1950 season.

Methods of Construction

Late last season and the early part of this year, Zenith Dredge Co. men and equipment were busy building the rubble-mound underwater sections of the breakwater in advance of the time when the timber cribs could be finished and towed to the site. Toe stone, cover

(Continued on next page)



stone, and smaller material for the rubble mound was being produced in a commercial quarry which Zenith has operated near Duluth for many years. (See previous article in C & E Monthly.)

The derrick boats Faith and Powerful were sent to Two Harbors with the 250-hp tug Chattanooga as a tender, to work on construction. The Chattanooga is a 65-foot diesel-powered craft, squat and seaworthy. A smaller launch, the 100-hp John V, was also brought in.

Specifications for toe stone called for pieces each weighing 10 tons or more. Huge chunks of hard greenish-blue gabbro, blasted out of the quarry walls, were loaded on flatcars and shipped via the Duluth, Missabe & Iron Range railroad to the DM&IR merchandise dock at Two Harbors. There the heavy stones were transferred to the open decks of the Faith and Powerful, which often took a trainload at a time.

When the derrick boats had picked up their loads, they were towed out on the breakwater site where the toe stones were to be set. Heavy anchors had already been placed at strategic locations along the line, and it was an easy matter for bow and stern lines to be run to spot the derrick boats and hold them in position. Elaborate shore ranges had previously been set by Army engineers and Einar Nelson, Zenith Dredge Co.'s Chief Engineer.

Chain-and-cable baskets were used to set the toe stones. The baskets were opened by means of a trip line, after the stone was in position, and no stone was turned loose until it was in its right position. Once the toe stones had been set to mark the toe locations, it was relatively simple to move in with loads of 1-ton-minus stone and build the rubble mound. As the mound rose up from the bottom, more cover stones weighing at least 5 tons were added along the sides. The location of toe and cover stones was carefully plotted each day, making a complete running record of the job.

When the mound had been brought up to minus 23 feet below low-water datum, an ingenious method was devised to level the mound as smooth as a dance floor in preparation for the cribs. Two 4-inch steel pipes 100 feet long were brought in, sunk on the projected side limits of the cribs, and their elevation checked with a surveyor's level. While the pipes were being lowered and set, a diver was in constant attendance. He placed supporting material under the pipes, or dug excess rock away to lower them to grade.

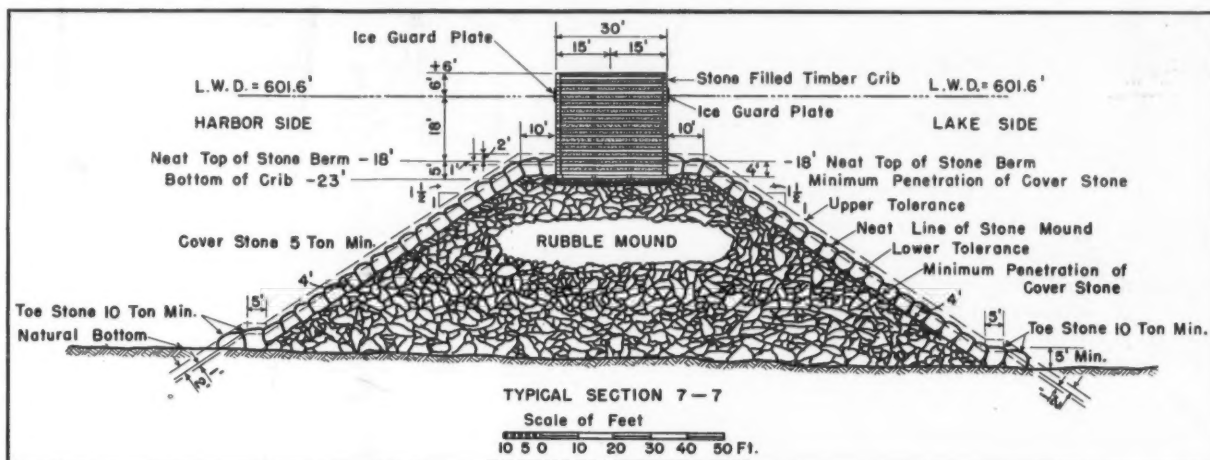
After this had been done, several carloads of fine leveling-course rock about 5 inches and under in size was shipped in. This material was carefully dumped in place between the pipe templates, and roughly leveled even with the top of pipe. Two divers then rolled a cross pipe along over the two pipe screeds, and when a high place was found it was shoveled away until the cross pipe would ride evenly again. This process made approximately 45 per cent of the accurate bearing area of the top of the mound available for the support of the cribs when they were sunk. It was continued lakeward until the mound was ready to receive the cribs.

That part of the rubble mound too low to provide bearing support to the cribs was later filled with stone. The process will be detailed a little later.

Construction of Cribs

A subcontract was entered into with the J. D. Harrold Co., a Duluth general contractor, for the construction of timber cribs and the breakwater superstructure after the uncompleted cribs had been placed. Harrold arranged for building space at Northern Pacific Dock No. 5 at Duluth, and began the work of fabricating the cribs about February 1, finishing the fifth crib on April 29.

Specifications for the cribs called for a structure with continuous timber



Cross section of the new breakwater at Two Harbors, Minn.

outer walls, a top deck, and a center ballast compartment with a continuous timber floor. The cribs were all-bolted construction. The bottom timber of the side walls, placed wide side down, was

12 x 18-inch Douglas fir. The top of crosswalls, the ballast floor, and the top decking were 6 x 12-inch Douglas fir. Shutter planking was 3 x 15-inch, and all other timber was 12 x 12-inch

Douglas fir. By far the major part of the timber used was the latter size.

Drift bolts 1 inch round by 17 inches long were required to engage one 6 (Continued on page 80)



A "Fuller" LINE of Heavy-duty Transmissions

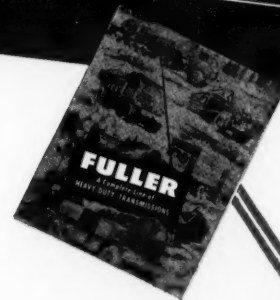
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Agriculture—Key to Flood Control

If all precipitation were made to soak into the ground, or to run off in small amounts of clear water, there would be little need of enlarging flood-control works as we know them today.

There are three schools of thought on this matter of flood control. The first advocates construction of large dams on rivers and streams. The second believes that levees are the answer. The third says that reforestation, planting, and scientific agriculture will solve the problem. CONTRACTORS AND ENGINEERS MONTHLY believes the time has come to recognize the importance of all three, with something more than lip service paid to the third—scientific agriculture in particular.

It is no longer enough for flood-control engineers to think of the soil in terms of gradation or shear strength alone. The time has come to consider soils in stream watersheds in terms of porosity, fertility, and organic content. The soil's ability to soak up moisture like a sponge, and hold it, should concern the flood-control engineer every bit as much as the design of a concrete mix.

At Malabar Farm, in Ohio, Louis Bromfield and his associates have proved beyond all doubt that worn-out soil can be reclaimed, new topsoil created from subsoil and organic matter, and the farm area made to take care of its own flood problem by itself. Moreover, Malabar Farm has proved that this can be done at individual profit to the farmer during the process. Apply the practice to an entire watershed, and some amazing results might be forthcoming.

The general need for flood-control structures would decrease, and hydro-electric dams could then function as such. Since it would no longer be necessary to design for a flood-control pool above the normal peak-power pool, these dams could furnish power, irrigation water, and recreational benefits to the people.

Too, the more rain and snow that soaked into the ground at higher levels, the better the ground-water supply farther down, and the less the need for Government irrigation works. This has generally been conceded by field engineers of the Bureau of Reclamation and the Soil Conservation Service, and by progressive farmers everywhere.

Most amazing of all is the fact that when soil is filled with plant life and billions of tiny organic "sponges" to soak up the water, it will increase its yield as much as seven times per acre! Consider this profit to the nation and the world in terms of a hungry population, which is growing rapidly, and the need for more food at lower cost. The problem is an engineering one, an economic one, and a sociological one, and the engineer can no longer ignore it.

The longer the problem is ignored, the more devastating future flood de-

struction is likely to be, in spite of whatever funds are thrown into the building of dams, channels, and levees. Bare, worn-out soil reacts to rain somewhat the way cement does. Its ground pores are sealed with the first drops, and much of the water is then free to roar madly towards the sea, carrying tons of soil away in the process.

Every gallon of water which can be made to go down into the soil will reduce the flood-control job by that much.

It will be a long, slow process. It cannot be accomplished overnight. We believe, however, that farmers and lumbermen will react enthusiastically to it if it is presented wisely by the Soil Conservation Service of the U. S. Department of Agriculture. Cattlemen, too, have something at stake, for every steer on the range takes valuable calcium, phosphorus, and minerals away from the soil. Restoration of that food to the soil is the only hope for farmer, lumberman, cattleman, and flood engineer alike. None of them can afford not to do something about it.

That, briefly, is the problem. And nobody need go to Congress with this one, for it can be solved by the people of the river drainage areas. Given time and study, it will be worked out to the advantage of all, we believe.

Construction Costs In Line With Others

Construction costs, and their relation to the general economy, were discussed by H. E. Foreman, Managing Director of The Associated General Contractors of America, Inc., at a recent meeting of the American Public Works Association. He pointed out at the beginning of his talk that there are two major points to be remembered during a discussion of construction costs: (1) that as a matter of practical observation, they are not out of line with prices in general, and (2) that unless there is an economic catastrophe, they can be expected to decline only gradually—certainly not drastically—from present price levels, as new methods of construction, more efficient designs, greater mechanization, and other improvements are developed.

Mr. Foreman emphasized that trends in construction costs cannot be considered apart from price trends throughout the economy, and that no major reduction in them can be expected unless there is a corresponding major reduction in prices in general. A comparison of trends indicates that construction costs have risen less, Mr. Foreman pointed out, than the cost of commodities in general. Using 1945 averages as 100, the Bureau of Labor Statistics' Wholesale Price Index for all commodities rose 57 per cent through June, 1948. The construction cost index compiled by the AGC shows an increase of 44 per cent in the same period. And the

composite mile-cost index for highway construction, compiled by the Public Roads Administration, shows an increase of 40 per cent.

Using 1939 averages as 100, the wholesale-commodity index had risen 112 per cent and the AGC index had risen 72 per cent by June, 1948. A comparison of buying power on the pre-war basis shows the construction dollar worth \$1.23 in relation to the dollar spent for commodities.

However, Mr. Foreman did make several suggestions as to how the construction industry can bring about certain economies and thus lower costs. He urged greater efficiency on the part of construction management as new methods are devised; greater productivity on the part of labor; improved machines, hand tools, and cost-saving materials from the equipment and materials industries; and new simplifications in specifications and designs from engineers and architects.

A general return to firm price quotations was especially urged by Mr. Foreman. "With material costs normally accounting for from 30 to 50 per cent of the cost of a construction project," he said, "it is of greatest importance that a contractor have a firm price for materials". He continued, "Future construction markets depend to a great extent on two factors: one that the owner understands and believes he is getting full value for his investment in the project; the other that he knows with reasonable accuracy the approximate cost before work starts". He pointed out that there is a trend towards firm price practices, with the notable exception of steel and cement. He also stressed the importance of co-operation between construction, design, planning, and other related groups.

Engineer in Construction Is Theme of Fall Meeting

Members of the Mid-South Section of the American Society of Civil Engineers recently held their fall meeting at the University of Mississippi. It featured an out-of-doors exhibition of some recent developments in construction equipment, with the machines shown under actual working conditions. The meeting stressed the use of the engineer and his abilities in construction work.

The meeting got under way with a welcome from Chancellor J. D. Williams, and a report on recent society activities. A panel discussion followed, on the subject, "Utilization of Engineering in Construction". Panel members were James T. Denton, General Superintendent, Merritt-Chapman & Scott, New York, N. Y.; B. J. Fry, Vice President, E. J. Albrecht Co., Chicago, Ill.; Nello L. Teer, Jr., Vice President, Nello L. Teer Co., Durham, N. C.; and E. E. White, Assistant Vice President, Spencer, White & Prentiss, New York, N. Y. F. H. Kellogg, Chairman, Department of Civil Engineering, University of Mississippi, was moderator.

A feature of the banquet was an address by Dwight W. Winkelman,

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President of The Associated General Contractors of America, Inc. Mr. Winkelman spoke on "Relations Between Civil Engineers and General Contractors".

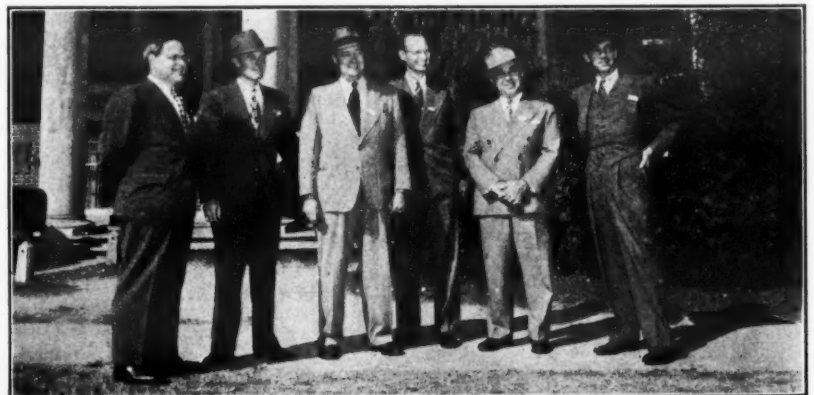
City Traffic Studies Aided by the State

Traffic-congested Virginia municipalities may now turn to the State for traffic-engineering assistance, according to a report received from the Virginia Department of Highways. Taking the view that the problems of city and state are not separated by corporate lines, the Department extends the engineering service to all city streets and to all phases of street transportation.

The traffic-engineering studies are offered to the municipalities at actual cost; the Highway Department provides the engineering personnel and the city pays for whatever additional help is needed. In cases of comprehensive surveys—similar to one conducted recently in Richmond—the projects are often jointly financed with state, Federal, and city funds.

The urban studies are carried out by the Traffic and Planning Division of the Highway Department under the general supervision of K. G. McWane, Traffic and Planning Engineer. Kenneth M. Wilkinson, Associate Traffic Engineer, is charged with the actual field work and preparation of reports and recommendations.

Among traffic problems investigated are parking, traffic control, enforcement, and legislation. After investigation, the Department is equipped to analyze the problems through standard procedures and to make recommendations for their solution. Studies range from city-wide traffic and parking surveys to those aimed at regulatory control of traffic at a single intersection. They have included inventories of curb and off-street parking, facilities, traffic-signal timing, appraisal of signs and markings, traffic flow, bus routings, channelization, speed zones and limits, pedestrian control, etc.



An autumn sun and smiling faces—at the October meeting of the Mid-South Section of the ASCE held at the University of Mississippi. Left to right are panel speakers Edward E. White, B. J. Fry, James T. Denton, with Dean Lee H. Johnson, AGC President Dwight W. Winkelman, and speaker Nello L. Teer, Jr.

A 7-Mile Water Tunnel Is Blasted Through Rock

Six Faces Worked at Same Time From Four Shafts; Will Augment Baltimore's Present Water System

By WILLIAM H. QUIRK,
Eastern Editor

(Photos on pages 50 and 51)

DEEP beneath the busy north side of Baltimore, Md., a 7-mile-long high-pressure water tunnel is being bored through solid rock. The city needs the extra water that this new tunnel will convey from a fresh source of supply. It needs it so much that the specifications for the tunnel, as drawn up by the City Department of Public Works, call for all possible speed in construction. Accordingly, the tunnel is being dug by working six faces simultaneously from four shafts that were sunk in a prior contract. The end or terminal shafts at the extremities of the pipe line can naturally have but one face; each of the two intermediate shafts, however, has two faces.

In March, 1947, the City awarded a contract for the long, pressure water tunnel to Samuel R. Rosoff, Ltd., of New York City on a low bid of \$9,137,200. Actual digging began that October, and the tunnel excavation is expected to be completed before the end of this year. This contract also includes a concrete tunnel lining which is scheduled to be finished near the close of 1949.

The tunnel is not uniform in cross section throughout its 7-mile length. For nearly the first 3 miles on the west, from Powder Mill shaft to Druid shaft, it is 10 feet in diameter and will have a 6-inch monolithic concrete lining. For the remaining 4 miles the diameter is 7 feet, and the water will flow through Lock Joint concrete tunnel-liner pipe. The pipe will be 4½ inches thick for a 3-mile section; for the remaining portion, which is slightly over a mile, the pipe will be 8 inches thick.

Existing Water Supply Inadequate

Thus far in 1948, the 1,500,000 people in the Baltimore metropolitan area are consuming water at the rate of 193.2 million gallons daily. Last year the average consumption was 189.2 mgd, while ten years ago in 1938 the average rate was only 115.9 mgd. This rapid rise is a source of concern to the city's engineers, for the safe yield from Gunpowder Falls, the present water supply, is but 148 mgd based on the 1930-1932 period when the worst drought on record was experienced. These high consumption figures are not expected to lessen, since industrial Baltimore is continually expanding, thus placing greater demands on the city water-supply system.

The present water supply for Baltimore comes from the Gunpowder watershed which includes reservoirs at Loch Raven and Prettyboy, north of the city. This near-by source of water serves approximately 94 square miles of city proper, and additional large areas in Baltimore, Anne Arundel, and Howard Counties. Included in the complete system are two filter plants at Montebello in the northeastern section of the city, a vast gridiron of water mains, together with pumping stations and reservoirs. The distribution pipes and mains total 1,800 miles, through which flows the water for domestic, industrial, and manufacturing use, as well as for fire fighting.

To augment this present system, the

City is planning to construct a new dam and reservoir at Falls Run on the north branch of the Patapsco River, a few miles west of the city. This independent source of water will have a high, initial safe yield of 95 mgd, largely by gravity, and can easily be connected with the existing system. The dam will be a concrete gravity structure 560 feet long and 150 feet high, with a 480-foot spillway. It will require 180,000 cubic yards of concrete. It will create a reservoir of 43,000,000,000 gallons at elevation 420 which will be the equal of the combined capacities of the Loch Raven and Prettyboy reservoirs.



Baltimore Bureau of Water Supply Photo

A section of the Montebello tunnel which Samuel R. Rosoff excavated through rock for the City of Baltimore to carry water from a fresh source of supply. This eastern section of the 7-mile project will be lined with 8-inch concrete pipe.

New Pipe Line

From the proposed reservoir the water will flow by gravity through a concrete-lined tunnel with a 10-foot finished diameter to the site of a future

filtration plant on Druid Park Drive east of Liberty Heights Avenue. This section of tunnel will be about 12 miles long, and will have a 6-inch monolithic (Continued on next page)



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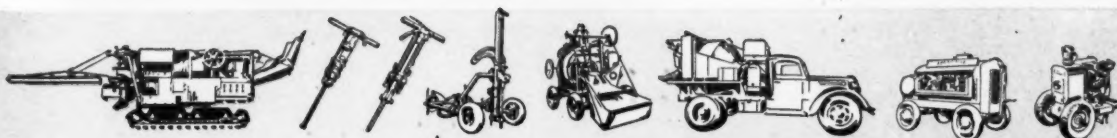
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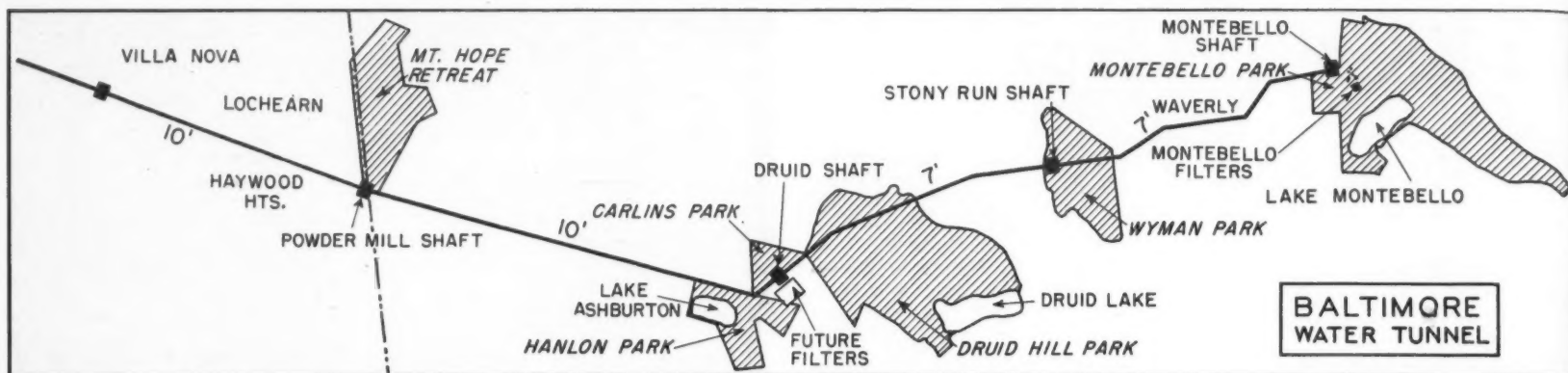
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IF IT'S A CONSTRUCTION JOB, IT'S A BLUE BRUTE JOB



A Seven-Mile Water Tunnel Blasted Through Solid Rock

(Continued from preceding page)

concrete lining. The eastern 3-mile section of this line from Powder Mill shaft to Druid shaft is included in the Rosoff contract. Powder Mill shaft is at the west city line of Baltimore on Liberty Heights Avenue. The section of tunnel from the city line west to the reservoir has also been awarded to S. R. Rosoff, Ltd., at a low bid of \$9,717,777.77; the greater portion of it will be unlined until the new Falls Run dam is constructed.

A continuation of the tunnel east, from the future filtration plant near intermediate Druid shaft to the present filtration plants at Montebello, comprises the rest of the contract, which is entirely within the city. This line passes under Druid Hill Park, and also under the grounds of Johns Hopkins University near where Stony Run, the other intermediate shaft, is located. The eastern terminal shaft is located at Montebello.

The 7-foot tunnel east from the future Druid filtration plant will carry filtered water; hence the tightness of the tunnel lining is of great concern from a sanitation viewpoint. Precast concrete cylinder pipe will be employed there, with the walls either 4½ or 8 inches thick. The thicker pipe is used where the effective overburden is deficient, as it can withstand the entire static pressure. A concrete backfill will be placed around the 7-foot concrete pipe, and then the entire tunnel will be grouted, including the portion with the monolithic lining.

Four Deep Shafts

The four shafts, from which the new water line within the city is being constructed, were completed in the spring of 1947 under a separate contract to the Steirs Construction Co. of St. Louis, Mo. Powder Mill shaft, the west terminal of the present contract, is on Liberty Heights Avenue, just inside the west boundary of the city, and is 175 feet deep. From there the 10-foot tunnel with the monolithic lining drops on a 0.50 per cent grade to the 285-foot Druid shaft on Druid Park Drive, a distance of 14,200 linear feet.

From there the 7-foot tunnel with the 4½-inch liner continues on approximately the same downgrade for a little over a mile, when the profile changes to a descending 0.02 per cent grade for the rest of the tunnel. The next shaft is the 100-foot-deep Stony Run in Wyman Park, across from Johns Hopkins University. The distance from Druid shaft is 10,200 linear feet, all with the 4½-inch liner pipe. Of the remaining 10,900 linear feet of 7-foot tunnel, 6,000 linear feet will be lined with the 8-inch liner pipe. It ends at the Montebello shaft, 180 feet deep, and the eastern terminal of the project where the existing filtration plants are located. At that point the new water supply will be admitted to the city distribution system.

The contractor on the shafts also extended the tunnel headings out 300 feet from the bottoms of the holes. This permitted the tunnel contractor to begin excavating right away at the different faces with pneumatic equipment, in-

stead of spending a lot of time on hand operations in a limited area at the base of each shaft. At the tops of the shafts the tunnel contractor erected tubular steel headframes to a height of 80 feet above the ground. From the headframes a cage is suspended in each shaft. It is a platform cage with counterbalance, and is operated on a two-part line by a single-drum mine-type hoist unit. The cages have a load speed of 250 feet per minute, and are outfitted with safety devices that will hold a 25-ton load in event of cable failure.

At Druid there is a double shaft with inside dimensions averaging 30 x 18 feet. Only half of this cross-sectional area, however, is used for the hoisting equipment. When the tunnel is completed, two 10-foot risers will be constructed in the Druid shaft as part of the filtration system.

Tunnel Through Rock

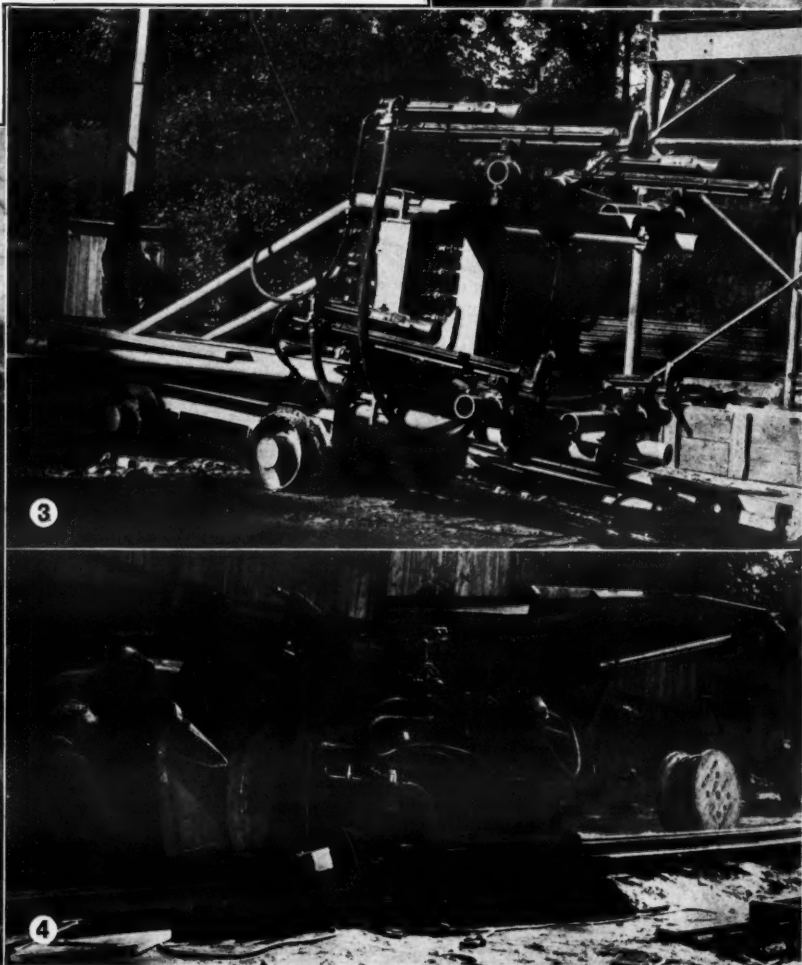
In preparation for the tunnel construction, fifteen core-drill holes were made about ½ mile apart over the length of the project. They indicated

that the tunnel would be bored completely through such rock as basic igneous, granite, pegmatite, acid (gray) gneiss of variable composition, micaceous quartzite, and others. The contractor has found it necessary to support only about 3 per cent of the tunnel, where the rock was too loose and unstable to stand by itself.

A construction plant was set up around each shaft to carry on the tunneling operations. This consisted of powder and cap magazines, battery-charger shops for the electric locomotives, air-compressor facilities, ventilating equipment, change houses for the workers, storage rooms, first-aid stations, and engineering offices. At the Druid shaft the contractor also set up his general office in a large air-conditioned Quonset hut, a general store-room, a "drill doctor's" shop where all drills were maintained, a blacksmith and steel-sharpening shop, and facilities for repairs to heavy equipment. All drill steel was forged and sharpened at the Druid shop.

(Continued on next page)

Photo 1 shows a section of the Montebello tunnel supported by steel ribs, with the drill jumbo in the background. In only about 3 per cent of the tunnel was the rock too loose and unstable to stand by itself. Photo 2: J. E. Holden (left) General Superintendent for Samuel R. Rosoff, Ltd.; and Resident Engineer Bernard L. Werner. Photo 3 shows the drill jumbo outside the tunnel, with its five Chicago Pneumatic drills mounted on 4-inch pipe pedestals. And in photo 4 is the Elmcro rocker shovel, Model 40, which scoops up muck in its ¼-yard shovel and deposits it in a ½-yard hopper at the rear; from there it is discharged onto the conveyor belt and dumped into the muck cars attached to the mucker drawbar.



John F. Peacock, Baltimore Bureau of Water Supply, and C. & E. M. Photos



C. & E. M. Photo

In the hoist tower at the Druid shaft, the cage is raised as a mine car dumps rock into a hopper bin. The four shafts for the Baltimore water-tunnel job were dug under a separate contract by the Stiers Construction Co. of St. Louis.

As soon as enough of the plant and enough equipment had been assembled around each shaft, the work in the tunnel commenced. Excavation began at Stony Point shaft in October, 1947; at Druid the following month; at Powder Mill during January, 1948; and at Montebello in April, 1948. Tunnel excavation then continued simultaneously in all six headings.

Working in Free Air

Ordinary rock-tunneling methods were followed in the construction: that is, a full-face heading was bored in free air without having to resort to air pressure in the solid rock strata. Ventilation was supplied to each heading by an individual electrically driven Model 40 Buffalo Industrial Exhauster. Six of these were used, one at each heading, and by means of a series of gates the air was either blown into or exhausted from the tunnel. Thus after a blast the smoke and fumes were withdrawn from the heading by using the exhaust, and then the direction of flow was reversed so that fresh air was blown into the tunnel. The exhaust and blower stacks rising from the roof of the sheet-metal ventilating building were set at different heights so the exhausted air would not be drawn back into the line when the fan was switched into a blower.

On the long lines into the tunnel, each fan, with a capacity of 5,000 cfm, was augmented by a booster driven by a G-E Tri-Clad induction motor. The air moved through a Naylor spiral-weld steel pipe, 18 inches in diameter. In the larger 10-foot tunnel the pipe was run along the side of the excavation. In the 7-foot tunnel it was supported from the roof; otherwise there would have been insufficient space for the muck-car track layout.

Compressed Air for Drills

At the two terminal shafts, compressed air for the drills used in boring the tunnel was supplied by diesel-driven air compressors. A battery of three Chicago Pneumatic 500-cfm units at each end shaft gave a total capacity of 1,500 cubic feet of air per minute. The

compressed air was conducted along the side of the tunnel to the heading through a 6-inch steel pipe outfitted with Gustin-Bacon roller grip joints.

At the two intermediate shafts, each supplying two headings with air, Chicago Pneumatic electrically driven compressors were used. Four such units, with a total capacity of over 2,500 cfm, were installed in metal compressor houses at both the Druid and Stony Point shafts. At the Druid location, the four Chicago Pneumatic YCM-type compressors were of the following sizes: two 14½—9 x 7 at 640 cfm each; one 15¼—9½ x 7 at 707 cfm; and one 13½—8 x 7 at 553 cfm. The total capacity was 2,540 cfm, and the pressure 100 psi. They were all powered by G-E synchronous electric motors. The compressed air was cooled, then pumped to a receiving tank outside the building, and from there was piped to the tunnel headings.

Five-Drill Jumbo

Five Chicago Pneumatic Model 60



C. & E. M. Photo

Contractor Rosoff set up this central blacksmith shop for the Baltimore tunnel project at the Druid shaft. This view shows a Gardner-Denver furnace and forge hammer.

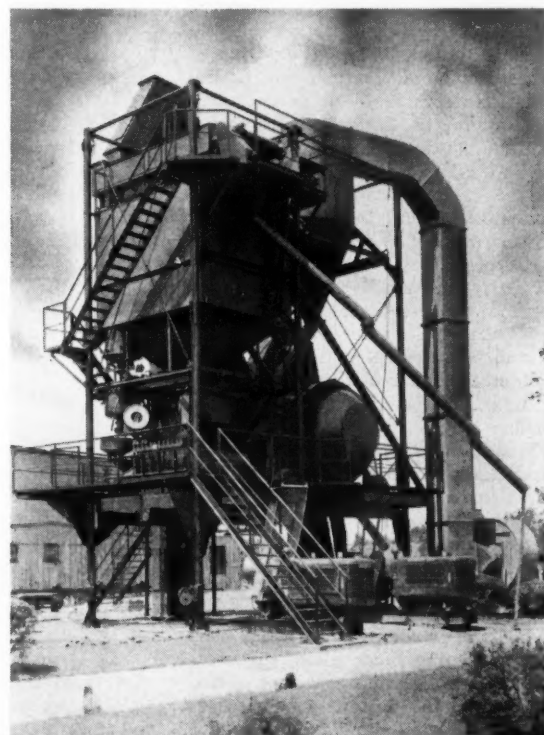
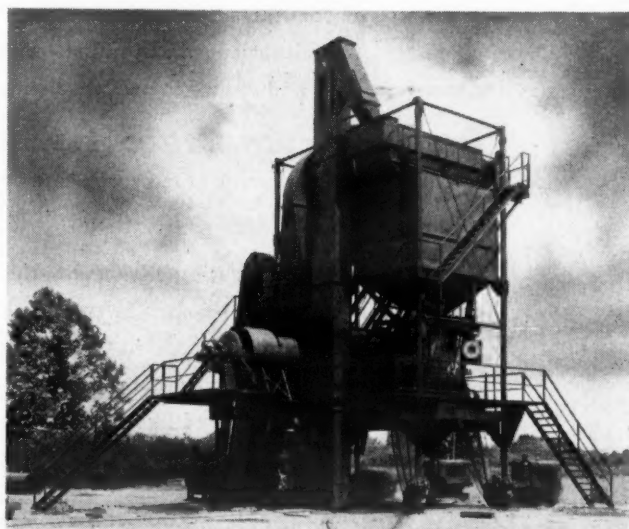
3½-inch rotor-drifter water-liner drills, mounted on a jumbo or drill carriage, made the blast holes over the full head-

ing face. The jumbos were especially made by the contractor for this job to
(Continued on next page)



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Seven-Mile Tunnel Blasted Through Rock

(Continued from preceding page)

suit the conditions of the tunnel. They were constructed of steel, and moved over the 24-inch-gage tracks on four wheels. The drifters were mounted on 4-inch pipe pedestals, and could be moved both vertically and horizontally so as to cover the entire heading. The five drifters were grouped, with one at the top known as the arch, two at the sides called the right and left wings, and the remaining two at the bottom designated the right and left lifters. The drillers operated the drifters from timber platforms at the different levels.

At the rear of the carriage were the connections for the compressed air and water lines. The air flowed into a manifold from the pipe line carried into the tunnel. This manifold had six take-offs for that many drifters, though only five were used. Water was supplied to the drills by a 2-inch steel line, also hung along the side of the tunnel.

Repairs to the drills were made at the "drill doctor's" shop, while the drill steel was forged and resharpened at the blacksmith shop. The latter was a Quonset hut, and both had concrete foundation floors. Bethlehem drill steel was supplied in 21-foot lengths, 1 1/4 inch round, and was cut to the required sizes by a Radiac cut-off machine. The steel was then heated in a Gardner-Denver oil-burning furnace, and the bits were fashioned and also resharpened in a Gardner-Denver forge. Drilling was started with 3-foot lengths and increased by 2-foot increments. The short starting lengths used 2 1/2-inch bits; the 5-foot steel had 2-inch bits; 7-foot steel had 1 3/4-inch bits; 9-foot steel had 1 3/4-inch bits; and the 11-foot steel, the longest used, took a 1 3/4-inch bit. The Druid shop had five complete units of furnaces, forges, and quenching baths.

Usually 2 feet of rock was drilled before a bit needed resharpening, but at times a bit went as little as 8 inches before it had to be replaced. The jumbo also carried a couple of Chicago Pneumatic 34 stoper rotors which were used for drilling plug holes along the sides of the tunnels. Steel plugs were inserted in holes, and the various service pipes were strung from them by wire. This was generally done as the jumbo moved forward to the heading after a blast.

Drill Pattern

The crew of a drill jumbo consisted of a shifter or heading boss with ten men doing the drilling—a miner and a chuck tender for each drifter—and one nipper. The nipper relieved the drill crew of the dulled steel, and handed them the resharpened lengths. A typical drill pattern consisted of 30 or 32 holes drilled 9 feet deep into the heading. At the center a burn cut was drilled with from three to five holes. This was shot first. Beyond the center were four relievers, two on a side. Around the periphery were about eight line holes. Between these holes the area was drilled with twelve or more reliever holes.

The holes were charged with Atlas Gelodyn No. 1 powder, with anywhere from 150 to 225 pounds of dynamite to a blast. The charge was detonated in a series of eight delays, at intervals of 1/5 second, by means of delayed-action blasting caps. The first holes touched off were at the center, with the progress extending outward until the eighth delays were reached at the bottom circumference.

For the 10-foot-diameter tunnel section, the minimum line of excavation was 11 feet to take care of the 6-inch monolithic concrete lining. No rock was permitted to extend inside this line. Great care was taken in the drilling and shooting to control the overbreak so it would not exceed 35 per cent of the

total volume per foot of tunnel. In the 7-foot tunnel, the minimum excavation was 9-foot 4-inch diameter to allow for the 4 1/2 and 8-inch sizes of the Lock Joint concrete pipe which came in 15-foot 10-inch lengths. In the smaller tunnel the contractor tried to control the overbreak to between 40 and 45 per cent.

Shooting

After the heading holes were drilled, which took from one to three hours, they were loaded with powder brought down from the magazines above ground. The dynamite and caps were stored in separate houses which were 125 feet apart and constructed with dual wooden walls, 6 inches on centers and filled with sand. The roof was of similar construction with the upper deck sheathed in metal. Both structures were painted red and illuminated at night with spot floodlights. For ventilation, the powder magazine had five apertures around the bottom and three at the top rear. Only enough primers to last for three shifts,

or a single day's supply, were made up at a time in the cap house.

The powder monkey then loaded the powder car which was divided into three compartments. The largest compartment took about half the capacity of the car and was used for transporting


the dynamite; the other two compartments held the primers and stemming plugs. Very little stemming was done on this job, however. The powder car was towed along the 24-inch-gage track, put on the cage, and lowered to the bottom

(Continued on next page)

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CONSTRUCTION MACHINERY

of the shaft where it was towed to the heading by one of the electric locomotives. All track, both in the tunnel and on the surface, is 24-inch gage composed of 60-pound rail with standard switch points and frogs.

Light in the tunnel is supplied on a 220-volt circuit. The 50-watt lamps are strung along on 8-foot spacing right up to the face where there is a cluster of five lights. High-tension current for the project is purchased locally, and delivered through a high-voltage line to a transformer substation at each shaft. There it is stepped down to 440 volts for distribution to the tunnel and various surface installations. Other transformers reduce the voltage still further to 220 for the lighting and shooting lines.

The regular 220-volt light line is carried to within 250 feet of the face, where a temporary three-streamer light line is continued the rest of the way up to the heading. When the powder car was towed in, this temporary 250-foot line was disconnected, and the heading was in darkness except for the two 150-watt lights mounted on the locomotive. In the interest of safety, the light line was not used for fear of possible sparks.

The crew from the jumbo carried the powder boxes forward to the heading, and the holes were loaded from the drill carriage. The powder car was then towed out, and the locomotive returned to pull the drill-steel car and the jumbo back to a safe place in the tunnel away from the heading.

The 220-volt shooting line took off the regular buss line, about 1,500 feet back from the face, and crossed the tunnel to the side opposite the light line. A jumper switch was put in this line about 200 to 400 feet back from the heading as another safety precaution. The firing switch was back at least 1,500 feet from the heading.

Communication between the ground and the tunnel is maintained by means of a Teletalk system with a key point at the foot of the shaft. It also extends down the tunnel to points about 200 feet from the heading.

A chart with comprehensive information on the drilling and explosive data was kept on each round. This included columns for the date, shift, time fired, heading foreman, and the names of the inspectors. The drilling data covered the number and depth of holes for the three classifications of cut, relief, and line; the linear feet of holes; number of drills and drilling time. Under the explosive data were listed the number of holes; the amount of explosives such as the number of 50-pound cases, primers, and sticks; the strength of explosives; number of delays; position of detonator; type of stemming; misfires and how they were handled; how the round pulled; the stationing before and after the shot; the footage gained; and finally remarks.

A typical shot picked at random from the history of one shift showed that 29 holes—three cut, thirteen relief, and thirteen line—were drilled with five drills in 2 hours and 20 minutes. The linear feet of holes totaled 261, and they were charged with three 50-pound cases or 345 sticks of G-1 explosives requiring 29 primers. From 0 to 8 delays were used without stemming, and with the detonator in the second position. The round pulled well; there were no misfires; and, according to the stationing, the footage of tunnel gained was 9.

Pneumatic Mucker

After the blast the light line was re-installed, and the pneumatic mucking machine was moved forward on the track to the heading. Eimco rocker shovels, Models 40 and 21, did all the mucking. Though the machines are similar, the 40 is equipped with a conveyor belt for moving the muck, while the smaller Model 21 uses a series of buckets to dump rock into the muck cars.

With the No. 40, which weighs 8 tons, the muck or rock is scooped up by the $\frac{1}{4}$ -yard bucket at the front end. The bucket moves up and down, and also swings along a rack in a 60-degree arc. It throws the muck back into a $\frac{1}{2}$ -yard hopper directly to the rear, and from there it moves backward on a conveyor belt to discharge into the muck cars which are hooked to the drawbar of the mucking machine. The discharging is a separate operation; the mucker can continue working even if no car is behind, as the muck can be loaded into the hopper.

The mucker is driven by compressed air, and runs back and forth while digging. It operates on four large drive wheels moving on special 36-inch-gage track. With these three movements—back and forth on the rails, up and down with the bucket, and a sideward

swing of the bucket—the muck was quickly loaded into the cars. When it was being towed, the mucking machine traveled on four smaller wheels over the 24-inch-gage track. Towing was done by one of the electric locomotives.

Excavation

Before and during the mucking, loose rock at the roof and sides of the tunnel was knocked down with picks and scaling bars to prevent it from falling later and causing injury. The muck was loaded into side-dump cars with a capacity of $2\frac{3}{4}$ yards, and hauled in 7-car trains by Greensburg 7-ton electric locomotives equipped with twelve Exide 4-cell storage batteries. Maneuvering of the cars in the tunnel was handled by the use of a double track up near the heading in the larger tunnel, and also by car passers in both sizes of tunnels.

The car passer was generally about 250 feet back from the heading, and consisted of a short section of track placed at right angles to the regular 24-inch-gage track. To shift a muck car, it was first run up on a small incline placed over the regular track at the car passer. This section of inclined track was supported on auxiliary wheels set at right angles to the wheels of a muck car. Then the muck car, still supported on the inclined roller, was pushed out on the car passer, and other cars could pass on the regular track. In a small tunnel the car passer performs satisfactorily, whereas the cherry-picker type cannot be utilized because of the limited headroom.

The usual procedure was to have a locomotive push a string of cars up to the mucker and leave one to be filled.

(Continued on next page)

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Seven-Mile Tunnel Blasted Through Rock

(Continued from preceding page)

As soon as it was filled, the muck car was pulled back and sidetracked on the car passer, while another car was pushed forward to the heading. When the train had gone by the car passer, the loaded muck car was returned to the main track. This operation was repeated until the loaded cars were all behind the car passer. Other locomotives operating from the shaft towed the cars to the hoist.

Teletalk units were also set up at the car passer, for there was practically always someone stationed there. Constant communication was thus maintained between the hoist house, top and bottom of shaft, and points deep in the tunnels.

The cars were raised one at a time on the hoist, up beyond the surface of the ground to the hopper bin halfway up the head frame. The Druid shaft was equipped with a McKiernan-Terry 48-inch-diameter drum hoist, driven by a G-E 150-hp motor and operating on 1-inch steel cable. From the hopper bin the rock was discharged into trucks which hauled it away, either to be sold or to be disposed of in some manner. Some 55,000 cubic yards of the rock was taken away by the City and will be used for constructing a wash-water dam.

Moving Ahead

As the mucking advanced, any portions of the tunnel where the rock appeared to be loose and shaky were supported by steel ribs. These were usually assembled from the drill carriage, and were set on 4-foot centers on top of foot blocks. The two pieces of steel I-beams were bolted together at the top to make up the rib, and for additional strengthening the ribs were bolted together longitudinally with steel rods. Blocking and lagging behind the ribs consisted of 2 x 6's, 2 x 8's, 6 x 6's, or other large timbers.

When the mucking was completed, the face of the heading was thoroughly cleaned of any loose rock as a precaution against pieces striking the workers and against fouling up the drills. Line and grade was moved ahead by sighting along spads which were hung from the roof of the tunnel about 100 to 125 feet apart. A light was attached to the spad nearest the heading, while the sight was made from a spad farther back. The

center line of the tunnel was marked on the heading with yellow paint, as were also the vertical and horizontal lines of the cross section. Then a circle was swung over the rock facing, and the periphery of the tunnel was marked out in yellow paint. This was a guide for the drillers. Then the jumbo was moved back up to the heading and drilling resumed.

The 600 men on the job worked three shifts a day, from 8 a.m. to 4 p.m., from 4 p.m. to midnight, and from midnight to 8 a.m. As the work progressed, the amount of excavation per day steadily increased until an average of 36.8 feet of heading per day was maintained. The dynamite consumption averaged about 7 pounds per cubic yard of rock excavated. March, 1948, was the best month for excavation, with 4,964 feet of complete tunnel—1,825 feet of small and 3,139 feet of large tunnel.

Drainage

At the foot of each shaft a 10-foot sump was excavated below the grade of

the tunnel. Water infiltration at the shafts was moderate—around 600 gpm. Water entering the tunnel at points removed from the shaft was collected into small sumps or holes, and pumped out into a 6-inch Naylor spiral welded steel discharge line hung along the side of the tunnel. Chicago Pneumatic or Ingersoll-Rand pneumatic sump pumps were generally used throughout the tunnel.

The 6-inch line emptied into the sump at the bottom of the shaft. From there the water was constantly pumped to the surface through a 6-inch line by two 500-gpm centrifugal sump pumps driven by electric motors. These large sump pumps were usually either CP, I-R, or LaBour units, operated by G-E 50-hp motors.

Battery Charging

The Greensburg two-motor cruiser-type storage-battery electric locomotives had their twelve 4-cell series-connected Exide storage batteries recharged on an average of once every shift. A track ran from the top of the

shaft directly to the battery-charging house where the 3-ton battery was lifted out of the locomotive with a 4-point pick-up by a CM Meteor 3-ton electric hoist riding on an overhead beam track. A fully charged battery was immediately installed in the motor, while the used one was recharged.

Each station usually had five chargers. The one at Druid was equipped with four Motor Generator Corp. chargers, and one Hertner Electric Co. charger.

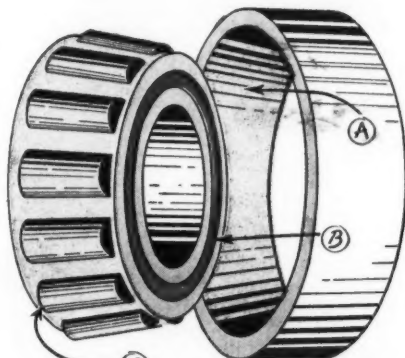
Finance and Personnel

This big new source-of-water project, the Patapsco Development, of which this present contract is only a part, is being financed through the sale of bonds. The Maryland State Legislature authorized the City of Baltimore to issue \$32,000,000 worth of bonds. Bond issues for capital improvements in the water system are self-supporting, as they are financed from revenue from the sale of water, and are not directly

(Concluded on next page)



CASE 1025--PROVIDING CONSTANT LUBRICATION IN WHEEL BEARINGS.



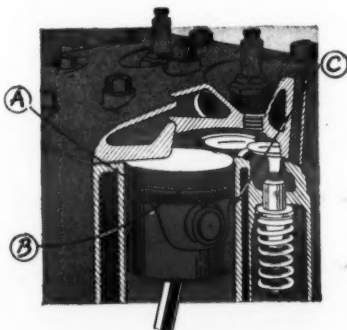
AUTOMOTIVE ROLLER WHEEL BEARING

Wheel bearings in trucks hauling heavy loads in desert heat, winter cold and rain, were in perfect condition long after usual servicing periods when the bearings were lubricated with RPM Wheel Bearing Grease. Recommended for all sizes and types of wheel bearings. Apply to bearing assemblies by hand or with mechanical lubricators.

- A. Maintains tough, resilient film on bearing surfaces - protects during constant pounding of road shocks and under overload pressures.
- B. Feeds slowly to bearing parts ... resists extreme temperatures - will not melt and run from hubs onto brakes.
- C. Stays in smallest bearing clearances.

RPM Wheel Bearing Grease provides good lubrication in the presence of water.

CASE 1017--REDUCING OVER- HAULS IN GASOLINE ENGINES.



SECTION OF GASOLINE ENGINE

When gasoline engines were lubricated with compounded RPM Motor Oil, pistons, cylinders, valve stems and other oil-contacted parts remained clear of carbon, gum and lacquer. Wear was minimized and rusting was not a problem. Recommended for gasoline engines. Five grades: SAE 10/10W to SAE 50.

- A. Contains detergent which loosens and removes carbonaceous matter, keeps it dispersed in the oil so it is removed with drainings. Assures free-working rings, valves and other parts.
- B. Sticks to hot spots - reduces usual wear on upper cylinders and pistons.
- C. Adherence to cylinders when engine is idle minimizes starting wear and prevents rusting - moisture will not cut through oil film.

Other compounds in RPM Motor Oil resist oxidation, prevent corrosion of bearings, and stop foaming.

Shunk Snow and Ice Removal BLADES

Proved record of superior performance. Made of specially developed steel to withstand severe service conditions.

FOR ALL TYPES AND MODELS OF SNOW PLOWS
Various widths, lengths, thicknesses—flat or curved—standard or special—punched ready to fit your machine.

SHUNK SAW-TOOTH ICE BLADE

Amazingly effective. Thoroughly breaks up and removes heavy, slippery ice and snow formations. Replaces all types of snow plow blades or maintenance units. Write for Bulletin and name of nearest Distributor.



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reflected in the tax rate.

The major items in the \$9,137,200 contract for the Liberty Road-Montebello Tunnel awarded to Samuel R. Rosoff, Ltd., include 133,000 cubic yards of rock excavation for the tunnel and 47,000 cubic yards of concrete backing, together with 21,100 linear feet of precast concrete cylinder pipe, 4½ and 8 inches thick, for the 7-foot tunnel. The 14,200 feet of 10-foot tunnel has a 6-inch concrete monolithic lining.

Personnel for Samuel R. Rosoff, Ltd., includes M. L. MacLean, Chief Engineer; J. F. Holden, General Superintendent; P. S. Miller, Resident Engineer; and A. T. Araneo, Field Engineer.

For the City of Baltimore the work was designed by Whitman, Requaardt & Associates, Engineers, and is being done under the direction of the Department of Public Works of which Paul L. Holland is Director. Leon Small is Water Engineer of the Bureau of Water Supply, J. S. Strohmeier is Deputy Water Engineer, and Bernard L. Werner is Resident Engineer of the project.

Sprayable Plow Wax

Penn-Drake snow-plow wax in a form suitable for spraying has been produced by the Pennsylvania Refining Co., 2686 Lisbon Road, Cleveland, Ohio. This new form of the wax can also be applied by brush, the manufacturer states.

Penn-Drake snow-plow wax is designed to create a hard, slick surface off which the snow will slide easily and so prevent piling. The wax is applied at the rate of about one gallon to 300 square feet of plow working surface if sprayed, and one gallon to 250 square feet if brushed on. It is available in 5-gallon pails or in 15, 30, and 55-gallon drums.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 25.

Bulldozing for Profits

"Bulldozing for Profits" is the title of a new catalog issued by the Caterpillar Tractor Co. of Peoria 8, Ill. Catalog No. 11693 stresses the versatility of this earth-moving tool and illustrates its use for grading operations, for heavy digging, backfilling drainage ditches, land clearing, leveling, etc.

Combination uses of the bulldozer are spotlighted in this booklet—with a Hystaway for stripping overburden, with the Fleco stumper for land clearing, and with the Fleco root rake for digging roots and piling brush. The booklet describes both cable-controlled and hydraulically controlled dozers of the straight and the angling type.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 82.

Auto Compressor Co. Sold

The Electric Sprayit Co. of Sheboygan, Wis., announces that it has taken over the complete manufacturing rights, inventory, and tooling of The Auto Compressor Co. of Wilmington, Ohio. Wilmington compressors are manufactured in single and two-stage, motor or gasoline-engine-driven models, in a range of from ¼ to 5 hp.

DECALS

The Long Lasting Economical Nameplate

10 Day Delivery

SEND PENCIL SKETCH AS TO SIZE AND NUMBER OF COLORS FOR PRICES

MIRACLE DECAL CO.

220 E. Harry WICHITA, KANSAS



Emulsion or cement stabilization, bituminous road-mix paving, and soil blending are handled by the new Gardner-Byrne one-pass traveling mixer. It is powered by a 135-hp diesel engine and features hydraulic one-man control.

Paving or Blending With One-Pass Mixer

A one-pass traveling mixer is announced by Gardner-Byrne Construction Co., Inc., 649 S. Olive St., Los Angeles 14, Calif. It is recommended by the company for emulsion or cement stabilization, bituminous road-mix paving,

or soil blending. Capacity of the mixer is rated at from 600 to 750 tons per hour for stabilization and paving operations, or 1,000 cubic yards per hour when used for soil blending. The machine is self-powered by a 135-hp diesel engine. It was engineered by the Frank J. Lopker Co., also of Los Angeles.

This hydraulically controlled unit is designed for one-man operation. It can be supplied with a tractor, or separately for use with any tow tractor in the proper horsepower range. In operation, it gathers material from windrows and carries it through the mixing cycle with six opposing rows of large harrow-type disks. These disks are mounted on a spool which rotates at relatively high speed. The dirt movement is circular and is also a beating back and forth. The material is thrown from the mixing spool onto a high-speed spinner which re-windrows it behind the mixer. Adjustable control of the aggregate flow is designed to assure positive proportioning of the material with water or liquid bitumen. The manufacturer explains that forward travel and water—or liquid bitumen—are accurately metered; both are clearly indicated on a single large dial in full view of the operator.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 33.

NEW

Thor

BACKFILL TAMPERS

NEW POWER FOR

FASTER WORK

NEW STREAMLINED DESIGN
EASIER HANDLING

Just open the valve . . . the new Thor Backfill Tamper will pound more dirt into the hole than you can shovel out of it!

Even the stiffest backfill is pounded solid—quickly, with the rapid, powerful blow of this new Thor . . . with a minimum of lifting by the operator. New plate valve and enlarged air ports deliver maximum power under varying air line pressure. Automatic lubrication. Positive-lock butt. Positive air seal.

Call your Thor dealer for a demonstration, or write for circular.



ACCESSORIES

For top efficiency, always specify Thor hose, couplings and clamps.

INDEPENDENT PNEUMATIC TOOL COMPANY

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Thor

PORTABLE POWER

TOOLS

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C. & E. M. Photos

A new Ingersoll-Rand X-71 wagon drill worked alongside a 1932 model (first photo) in a deep rock cut on the Osborne-Barnes reconstruction job on the Norwich-Groton Road in Connecticut. Foreman Pasquale A. Pirolo points to where the next hole is to be drilled. The second photo shows a general view of the 48-foot-deep rock cut, and the third shows a Lima 2-yard shovel loading a big chunk of rock into a Sterling truck.

Highway Relocation Removes Bad Curves

(Continued from page 1)

last spring. It was done by the Osborne-Barnes Co. of Danbury, Conn., on a low-bid contract price of \$256,956.

Beginning at Gales Ferry, north of the submarine base, the job ran northwards 2 miles, to tie in to a section of the same road that was reconstructed in 1946. Bad curves were removed by cutting through rocky prominences on new location instead of skirting them as was done in the old alignment. Unlike the old road which was waterbound macadam, bituminous surface-treated, the new pavement is bituminous penetration macadam. And the new pavement width is 22 feet as compared to 18 feet in the original road. Traffic was maintained as usual during the construction, even on the sections where the new and the old alignments coincided.

Rock Excavation

Nearly half the total excavation, or 51,063 cubic yards, was in rock. In one cut it was removed to an extreme depth of 48 feet at the top of a slope for a short distance on the east side. At this particular location the rock was taken out in two lifts. Over the whole job most of the rock was a hard granite. Blast holes were made with five wagon drills—two Clevelands and three Ingersoll-Rands. According to Foreman Pasquale Pirolo, veteran driller and dynamiter at Boulder Dam and other big projects, he used both the newest and the oldest I-R wagon drills to be found in Connecticut. The newest, an X-71 model, worked alongside a drill of 1932 vintage. Each drill was powered by its own 315-cfm air compressor. Of the five compressors, three were Schramms, while the other two were Ingersoll-Rand and Jaeger units.

Both Timken drill steel and bits were used with the drills. The steel was 1 1/4-inch round and started at 6 feet, increasing to 12, 18, and 24-foot lengths, while the bits decreased from 3-inch size down to 1 3/8-inch. The bits averaged 4 1/2 feet before being replaced. Holes were drilled on an average of 5-foot centers both ways. In the deeper cuts some occasional extra holes were staggered in with depths of from 10 to 12 feet to eliminate secondary blasting as much as possible.

The holes were charged with du Pont 40 per cent dynamite, of which as many as 22 sticks were used in the deepest 24-foot holes. The maximum charge, nearly a ton of powder, included 195 holes, while the average yield of rock over the job was 1 cubic yard for 3/4 pound of dynamite. Whenever secondary blasting was required to break up some of the larger chunks of rock, the holes were drilled with either a Worthington or an Ingersoll-Rand jackhammer.

Embankment Work

The rock was loaded out by a Lima

2-yard shovel into either two Linn Haf-traks, averaging 8 yards each, for hauls around 500 feet long, or into three Sterling 8-yard trucks and one 6-yard Autocar for hauls averaging 2,000 feet.

Roadway earth excavation was not available in sufficient quantities to complete the fills, so the necessary additional material was taken from three borrow pits within 1/2-mile haul of the

project. Two P&H shovels, a 1 1/2-yard and a 3/4-yard model, were available for use either in the pits or the roadway excavation. The earth was moved

(Continued on next page)

More footage Drilled LESS UPKEEP COST

When you protect
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and wear with
Texaco Rock Drill
Lubricants EP

YOU take rust and wear out of the category of major "headaches" when you protect your drills with Texaco Rock Drill Lubricants EP. At the same time, you assure more trouble-free operation (which means more footage per shift) . . . longer drill life . . . lower maintenance costs.

Texaco Rock Drill Lubricants EP have the "extreme pressure" characteristics necessary to protect moving parts against wear under the severest conditions. Furthermore, they resist washoff . . . stay fluid at low temperatures . . . keep parts free of gum and carbon formations . . . and guard against rust whether drills are running or idle.

Texaco Rock Drill Lubricants EP meet the specifications of leading rock drill manufacturers. Use the viscosities recommended for your particular drills and operating conditions.

For greater efficiency in compressor operation . . . for free rings, clean valves, clear airlines . . . use the recommended Texaco Cetus, Alcaid or Algol Oils.

Let a Texaco Lubrication Engineer help you increase drilling efficiency and economy. Call the nearest of the more than 2300 Texaco Wholesale Distributing plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

Tune in . . .
TEXACO STAR THEATRE
presents MILTON BERLE
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broadcasts every
Saturday afternoon.



TEXACO

in trucks holding from 4 to 5 yards. These included 6 Dodges, 2 Macks, 2 Internationals, and an Autocar. Roadway earth was also moved by a couple of Gar Wood 10-yard scrapers pulled by Allis-Chalmers LO tractors. Trenches for culverts and underdrain were dug by Bucyrus-Erie $\frac{3}{4}$ and $\frac{3}{8}$ -yard drag shovels.

Embankment material was spread by four tractor-dozers—a Caterpillar D4 and three Allis-Chalmers, two Model K's and one Model L. An Allis-Chalmers and a Galion grader did the shaping. The rock was placed on the bottom of the fills as much as possible, and was always kept a foot below the subgrade. The earth was spread in 1-foot lifts, and was compacted by the equipment.

Gravel Sub-Base

A gravel sub-base was laid over the entire job, from 1 to 2 feet thick, and running out under the shoulders. In the earth cuts the gravel was laid to a depth of 1 foot, and in the rock cuts to a 2-foot depth. The fills were practically



C. & E. M. Photo

Here an Etnyre 2,610-gallon distributor on an Autocar shoots RT-3 tar on the gravel shoulders of Connecticut State Route 12 near Gales Ferry. D. J. Cronin, Inc., of E. Providence, R.I., did this part of the reconstruction job.

all gravel in the top layers, as the material for the sub-base came from the same pits that supplied the common borrow.

On top of the sub-base, a rolled-gravel base course was laid, measuring

8 inches in depth after compaction. The base was placed in two 4-inch courses to a width of 23 feet and is flanked by 10-foot shoulders sloping at the rate of $\frac{1}{2}$ inch to the foot. The shoulders were built of gravel, 8 inches thick, and were

later given a bituminous surface treatment. Where the fills are 4 feet high or less, the embankment slopes are 4 to 1; when they are over 4 feet in height the slopes are 2 to 1. In earth cuts the slopes are 2 to 1, and in rock cuts they are 1 to 2.

As the base-course gravel was being laid, each course was wet down by two 1,000-gallon tank trucks. The water for the supply was pumped from a brook by a Rex 2-inch pump. Compaction was achieved by two Buffalo-Springfield 3-wheel rollers—a 10-ton and 14-ton model. The gradation of the gravel for both the bottom and top 4-inch courses was as follows:

Sieve Size	Per Cent Passing	
	Bottom	Top
3 $\frac{1}{2}$ -inch	100	100
1 $\frac{1}{2}$ -inch	100	100
$\frac{3}{4}$ -inch	30-65	30-65
No. 40	5-30	5-30
No. 200	0-10	0-10

Macadam Surface Course

A 22-foot-wide bituminous-macadam surface course was then laid on top of the gravel base. This pavement is 2 $\frac{1}{2}$ inches thick and has a crown of $\frac{1}{4}$ inch to the foot. The crushed stone for the pavement came from the North Branford quarry of the New Haven Trap Rock Co., and was shipped 60 miles by rail to the Allyn's Point siding of the New Haven Railroad. The hopper-bottom cars were unloaded by a 40-foot x 24-inch conveyor, powered by a Le Roi engine, and the stone was then hauled to the job in trucks. The average haul was slightly over a mile.

The stone was spread by Nickerson and Burch spreader boxes, and rolled until it was properly compacted and keyed. It was then given a shot of 85-100 penetration asphalt at the rate of 1 $\frac{3}{4}$ gallon to the square yard, applied at temperatures of 275 to 350 degrees F. A cover coat of $\frac{3}{4}$ -inch stone was then spread on by hand, from stockpiles that had been dumped along the shoulders, at the rate of 45 pounds to the square yard. After brooming and rolling, a second application of the same penetration asphalt was applied at the rate of $\frac{3}{4}$ gallon to the square yard. This was covered with 24 pounds of $\frac{1}{2}$ -inch stone to the square yard, also put on by hand from stockpiles on the shoulders. Brooming and rolling followed as before. The gradation of the three sizes of stone used in the penetration macadam were as follows:

Sieve Size	Per Cent Passing		
	2-inch	$\frac{3}{4}$ -inch	$\frac{1}{4}$ -inch
2 $\frac{1}{4}$ -inch	100	....	....
2-inch	90-100	....	....
1 $\frac{1}{2}$ -inch	30-55	....	....
1 $\frac{1}{4}$ -inch	0-15	....	....
1-inch	0-5	100	....
$\frac{3}{4}$ -inch	....	90-100	....
$\frac{1}{2}$ -inch	....	....	100
$\frac{1}{4}$ -inch	....	10-40	90-100
$\frac{1}{8}$ -inch	....	0-20	30-50
No. 4	....	0-5	0-8
No. 8	....	....	0-3

Treated Shoulders

The gravel shoulders were given an application of $\frac{3}{4}$ gallon of RT-3 tar to the square yard, put on at a temperature of about 150 degrees F. After several days, a second application of RT-3 was added at the rate of $\frac{1}{4}$ gallon to the square yard. This was immediately covered with a sand blotter coat, put on by hand from conveniently spotted stockpiles. The sand conformed to the following gradation:

Sieve Size	Per Cent Passing
$\frac{3}{4}$ -inch	100
No. 4	95-100
No. 50	10-25
No. 100	0-5

All the bitumen used on the job was applied by D. J. Cronin, Inc., of East Providence, R. I., generally using an Etnyre 2,610-gallon distributor mounted on an Autocar. Large 4,200-gallon transport trailer trucks hauled the bitumen to the job where it was transferred to the distributor. The asphalt was supplied by Socony Vacuum Oil Co. and the tar by Koppers, Inc., both with plants at Providence, R. I.

(Concluded on next page)



Lubricants and Fuels

FOR ALL CONTRACTORS' EQUIPMENT

Highway Relocation Removes Bad Curves

(Continued from preceding page)

Quantities and Personnel

The major items included in the 2-mile contract were as follows:

Earth excavation	58,147 cu. yds.
Rock excavation	51,063 cu. yds.
Borrow	12,432 cu. yds.
Gravel base	14,384 cu. yds.
Stone for macadam pavement	4,472 tons
Tar	26,120 gals.
Asphalt	71,420 gals.
Gravel for shoulders	4,800 cu. yds.

The Osborne-Barnes Co. employed between 65 and 70 men during the peak of operations under the direction of J. B. Sanford, Jr., Superintendent. A. W. Cook is Engineer for the company.

This project was handled through the Norwich Residency of the Connecticut State Highway Department, with L. H. Beebe as Resident Engineer. R. D. Brown was Project Engineer, assisted by Lowell L. Benton. The Department is headed by G. A. Hill, State Highway Commissioner, with R. E. Jorgensen, Deputy Commissioner and Chief Engineer. Warren M. Creamer is Director of Engineering and Construction, and M. A. Tyack is Engineer of Contracts and Construction.

All-Hydraulic Crane Has a 3-Ton Capacity

A 3-ton-capacity crane-excavator unit is announced by the Hydrocrane Division of the Bucyrus-Erie Co., 7923 W. Greenfield Ave., Milwaukee 14, Wis. This all-hydraulic crane is for mounting on a 2½-ton-truck chassis. Its hydraulic system—driven by the truck engine—operates the boom, hoist, swing, outriggers, and attachments.

The telescopic boom on the Model H3 Hydrocrane is adjustable within a range of from 18 to 26 feet. The Hydrocrane is equipped with a ¾-yard bucket, and has a swing of 370 degrees. It achieves safety and speed of operation, according to the manufacturer, by the elimination of shafts, drums, gears, clutches, brakes, chains, and sprockets.

AD-X2 Reduces Battery Expense 90%

says Pipeline Contractor*

**HELPS PREVENT FREEZING
PROLONGS BATTERY LIFE**

● AD-X2's remarkable chemical action helps dissolve "sulfation" on your battery plates, keeps them clean, so normal operation of your car, truck, tractor, or other machine maintains battery charge. So effective it actually restores life to dead and junked, but mechanically sound batteries! Age does not matter; mechanical condition of battery is controlling factor. Proved by leading contractors and truckers.

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● Contains no material known to be injurious to storage batteries of the lead-acid type. You simply add AD-X2 to your battery, start motor, and the charge begins. Restores life to old, mechanically sound batteries, and lengthens life expectancy of new batteries. Helps prevent "sulfation" on idle batteries.

MONEYBACK GUARANTEE

● AD-X2 was developed with the assistance of a nationally recognized laboratory and is sold you on a moneyback guarantee. Beat this winter's toll on your batteries by ORDERING NOW. Single package for Group 1 or 2 regular automobile battery, \$2.50 postpaid. Group 3 or 4 requires 2 pkgs. per battery, 240 amp. approx. 12-volt, 4 pkgs. Carton of 12 pkgs. \$27.00. In California add 2½% sales tax. Use coupon below and ORDER TODAY.

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DR. MERLE RANDALL, Consultant

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Bank reference: 23rd Ave. Branch, Bank of America, Oakland, Cal.

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Enclosed is check.....Money Order..... for

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AD-X2 @ \$2.50 each postpaid, plus \$.....

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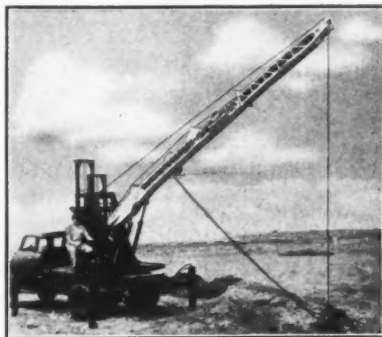
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State



Big brother to the 2-ton-capacity Model H2 Hydrocrane is this new 3-ton unit, the Model H3. All its operations are hydraulically controlled, from the closing action of the ¾-yard clamshell bucket to the 370-degree swing.

The unit weighs 9,375 pounds without the truck, is 24 feet 6 inches in length when mounted, and 10 feet 6 inches in height.

Attachments available for use with the Hydrocrane include a clamshell bucket, material-handling bucket, trash

or snow bucket, orange-peel catch-basin cleaner, grapple, and lifting magnet.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 23.

Storage of Rock Salt

To be of any value, rock salt for snow and ice control must be readily available when and where needed—which means, of course, that it has to be delivered and stored at crucial spots before snows even begin to fall. Now this brings up the question of how to store rock salt properly. And to help street and highway officials answer it, the International Salt Co., Inc., of Scranton, Pa., has prepared a pamphlet called "How to Provide Low-Cost Rock-Salt Storage".

The folder discusses the general problems encountered in storage of rock salt, and presents detailed information on how to solve them. Drawings illustrate eleven open, covered, and shed-

protected methods of storage, showing how the stockpiles can be built up and unloaded, and listing the advantages and capacities of each method.

Engineering data presented in the folder lists weight and volume of bulk Sterling salt; weight and volume of bags of Sterling rock salt; normal angle of repose of salt on salt; the best minimum slope of chutes during loading and unloading operations; and the style and size of the bottom of bins used for rock-salt storages. The folder also has a table listing the amount of bulk rock salt in conical piles of various sizes.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 85.

Senter Advanced by Armco

A. R. Senter is the new Manager of the Ashland Fabricating Division of Armco Drainage & Metal Products, Inc. This division is located at Ashland, Ky. Mr. Senter succeeds Willard See, who died last August 31.

**Get the Job Done QUICKER
and at LOWER COST on
Firestone
OFF-THE-HIGHWAY TIRES**

ON ALL types of road building and grading jobs, Firestone Ground Grip Tires save money because they provide the traction to move more dirt and they have the strength and durability to stay on the job with a minimum of "downtime."

All Firestone Off-the-Highway Tires . . . the Rock Grip, the Ground Grip, and the All-Traction . . . are time savers because they furnish the performance to make your equipment move faster . . . do more work. They cut costly downtime to a minimum because they are engineered and built to stand up on jobs where other tires can't "take it."

Regardless of the type of projects you handle, Firestone Off-the-Highway Tires will cut your operating costs. Give them a trial and see if your work doesn't speed up while your tire expense goes down.

Listen to the Voice of Firestone every Monday evening over NBC

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ROCK GRIP

ALL TRACTION

Firestone OFF-THE-HIGHWAY TIRES

Surfacing Materials Reworked by Crusher

A portable crushing unit for towing behind the Force-Feed Loader is announced by Athey Products Corp., 5631 W. 65th St., Chicago 38, Ill. Designed to provide a fast and inexpensive means of reclaiming highway pavements, it can be used for reworking surfacing materials, black-top, concrete, and gravel on the job site; thus it eliminates the necessity for transporting to and from a central crushing plant. According to the manufacturer, this one-man-operated unit picks up scarified or broken material from the road, crushes it to any required size, and deposits it back on the roadway in one continuous operation.

The impact mill is powered by a Caterpillar diesel engine through a multiple V-belt drive. The crusher hopper is fitted with breaker bars designed to pulverize the material and deflect it onto a grid iron, preventing the fines from entering the mill.

The portable crushing unit is mounted on a two-wheel rubber-tired trailer equipped with 13.00 x 24 tires. Hydraulic brakes are synchronized with, and operated from, the Force-Feed Loader-brake pedal. The trailer has a spring-cushioned automatic-type hitch coupling, hydraulic jack, and all-welded box-section chassis. Overall length of the Athey portable crushing unit is 13½ feet; width is 94 inches; and height is 11½ feet. Shipping weight is approximately 14,000 pounds.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 13.

Cement Batch Plant Built in Two Layers

A new type of cement batching plant is announced by the Butler Bin Co., Waukesha, Wis. The Auto-Batch Twin-bin is composed of two bins placed vertically, with the roof of the lower forming the floor of the upper. The upper bin is used for live storage, while the lower is used for reserve storage. Standing 30 feet high, the plant has a capacity of 533 barrels of cement.

The upper bin is filled by an elevator. When it is full, overflow is conducted to the lower chamber. During batching operations when the top bin is depleted, a gate in the lower bin allows the reserve to flow to the elevator which then refills the upper live-storage area. Discharge to the batcher is always from the upper bin.

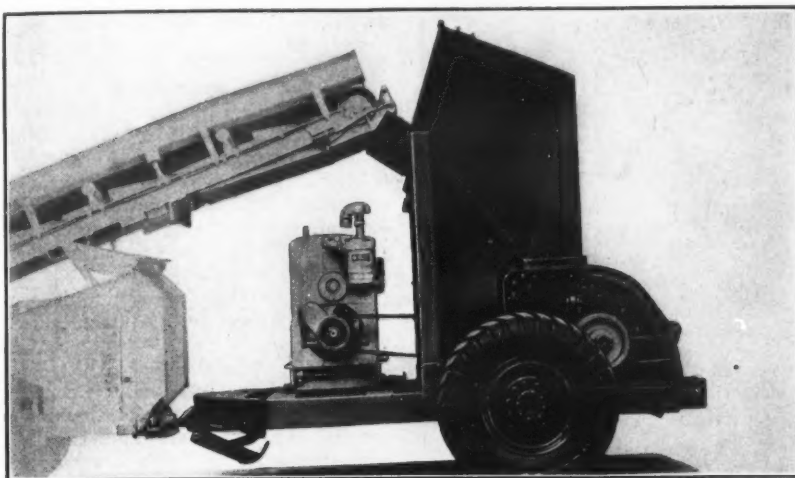
An automatic-dual batcher is situated on a platform built about halfway up the structure. According to the manufacturer, this batcher will load trucks at the rate of 2 batches every 65 seconds. The batcher is self-contained and is readily portable. Legs are spliced for easy dismantling and erection, and the entire bin is handled as one piece. The elevator is built in two pieces; the screw is a single unit.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 72.

High-Speed Earth-Movers

Broadsides describing the Model B Tournapull and the Model B Tornado dozer have been released by R. G. LeTourneau, Inc., Peoria, Ill. Both broadsides open to approximately 35 x 23 inches and feature large illustrations of these high-speed earth-moving machines.

Form TD-119 describes the 300-hp Tornado dozer, listing specifications on speed, tires, working weight, drive, capacity, etc. Form TP-163 lists complete specifications for the B Tournapull. It features an overhead cut-away diagram of the machine and points out the location, capacities, and specifications of the Tournamatic differential and transmis-



Towed behind the Athey Force-Feed Loader, this new crushing unit picks up scarified broken material from the road, crushes it to any required size, and deposits it back on the roadway in one continuous operation.

sion, the 30-yard bowl, the tapered bead tires, the individual electric-motor control, positive ejection, positive power

steer, and the multiple-disk air brakes.

Copies of this literature may be obtained from the company. Or use the

enclosed Request Card. For Bulletin TD-119, circle No. 80; for Bulletin TP-163, No. 81.

Whittelsey Is Promoted

Charles C. Whittelsey has been named Vice President in Charge of Construction Activities of Ford, Bacon & Davis, engineers-constructors of New York City, Philadelphia, Chicago, and Los Angeles. He has been with the firm since 1925 and was elected a Director in 1946. He has also been named Executive Vice President of the firm's subsidiary, Ford, Bacon & Davis Construction Corp. of Monroe, La.

Wernsdorfer Moved to Md.

R. A. Wernsdorfer, Service Engineer in charge of the service and repair facilities of The Black & Decker Mfg. Co. branch establishment at Atlanta, Ga., has been transferred in the same capacity to the Baltimore, Md., branch. He is succeeded in Atlanta by G. C. Wilhide, Jr.

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WATER BACK INTO
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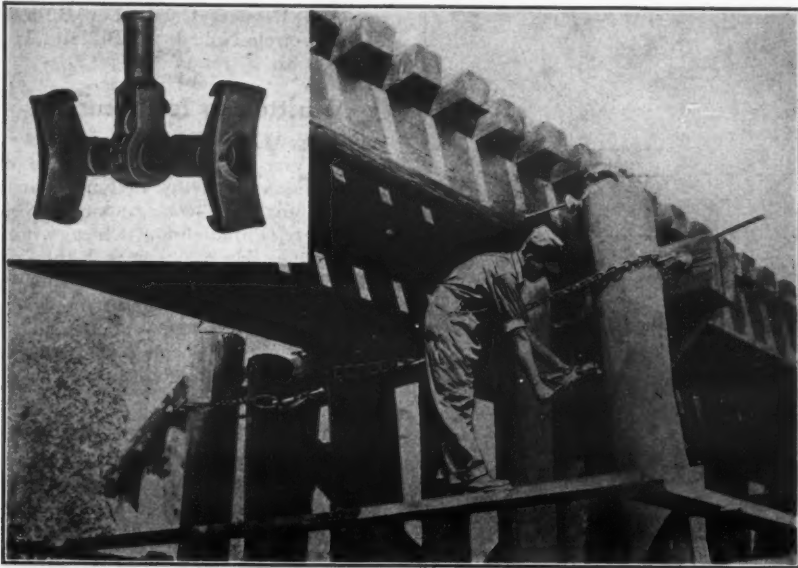
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Designed especially for lining up piles, the new Simplex push-and-pull jack features machined V-edged nut protrusions to assure a firm grip for pushing, and lugs which offer a firm hold for chain on pulling jobs.

Push-and-Pull Jacks For Lining Up Piles

A new Cramer-type push-and-pull jack is announced by Templeton, Kenly & Co., 1006 S. Central Ave., Chicago 44, Ill. It is recommended by the company for use in lining up piles, for general heavy construction, for work on trestle bridges, and for other projects requiring push-and-pull jacks. According to the manufacturer, machined V-edged nut protrusions provide a firm grip for pushing and save wear and tear on piles. Lugs offer a firm hold for chain on pulling jobs.

The new Simplex jack is available in two stock models. Model No. 5 is 11 inches in length when closed, extends to 17 inches, and weighs 34 pounds. Model No. 6 is 18 inches in length when closed, extends to 30 inches, and weighs 42 pounds. Both models have a screw diameter of 1 3/4 inches and a rated capacity of 12 tons. The jacks are manufactured in longer lengths on special order.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 43.

New York Office for DFPA

The Douglas Fir Plywood Association has opened a field office in New York City to provide increased service in the northeastern area for users of Douglas fir plywood. The office is under the direction of Regional Field Representative Robert N. Kelly and is located in Room 1706, The 500 Fifth Avenue Bldg.

Changes in Euclid Staff

The appointment of V. L. Snow as Assistant Sales Manager is announced by The Euclid Road Machinery Co. He is succeeded as Manager of the Sales Development Department by R. M. Brown.

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THE HAYWARD CO., 32-36 Day St., New York

Hayward Buckets

Adjustable Width Is Feature of Finisher

An improved model of the Longitudinal Finisher is being manufactured by the Koehring Co., 3026 W. Concordia Ave., Milwaukee 10, Wis. The finisher is designed to provide a mechanical means of finishing portland-cement concrete longitudinally, and to operate as a supplement to the transverse finisher.

Among the improvements incorporated in the new models are increased flexibility in width adjustments; the addition of a hydraulic screed lift to replace a manual-lift arrangement; a change in the position of the power unit to shorten the drive shaft for more efficient operation; and a cranking facility to effect changes in screed elevation for crown adjustments.

The width-adjustment feature is said to permit changes in the transverse width while the finisher is in motion—in any desired increment up to 4 feet. This makes the unit especially applica-

ble to work where varying pavement widths are encountered, says Koehring—such as at widened curve transitions, bridge widenings, and special widths at intersections.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 74.

Utility Spirit Level

Brass-bound wood spirit levels are manufactured by The E. A. Stevens Level Co. of Newton Falls, Ohio. They are constructed of kiln-dried California sugar-pine stock, finished in natural grain. Brass bindings are sealed to the wood edges, and each strip is held in place by 15 Phillips screws. The end plates are machined flush with the sides.

The Stevens levels are available in 24, 30, and 48-inch lengths. Each has four sensitive plumb vials and two level vials.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 26.

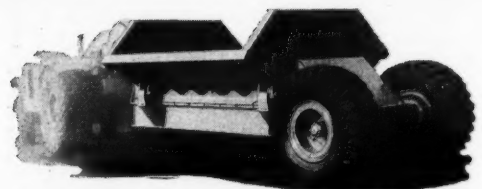
The New ATHEY PD-10Q QUARRY TRAILER ... High-Speed, Rubber-Tired Hauling Unit



● Setting new records in rock and quarry hauling, the Athey PD-10Q rubber-tired Trailer is a new production star in the hauling field. Speed and capacity, with agile dumping ability to either side, make this new teammate for the "Caterpillar" Diesel DW10 Tractor a profit winner for contractors and pit operators.

Sturdy, welded construction of new high-tensile strength steels withstands the impact and abrasion of rock loading. Heavy hexagonal shaped crossmembers absorb the torque or twist in the frame when dumping. Low pressure tires—interchangeable with the DW10 driving tires—reduce rolling resistance, permit faster hauling of heavier loads. See your nearest Athey-"Caterpillar" Dealer about the PD-10Q today, or write . . .

ATHEY PRODUCTS CORPORATION
5631 W. 65TH STREET, CHICAGO 38, ILL.



BRIEF PD-10Q SPECIFICATIONS

Capacity, Struck, Cubic Yards	5 1/2
Capacity, Heaped, Cubic Yards (approximate, based on 2:1 slope)	10
Dimensions:	
Overall Length, Trailer Only	23' 9 1/2"
Overall Length, with Tractor	35' 8"
Overall Width	10' 10"
Overall Height	7' 7"
Body Length, Inside	9' 8"
Body Height, Inside (Top of Side Plate)	2' 1"
Body Width, Inside	10' 2"
Loading Height, Across Side	5' 9 3/4"
Loading Height, Across End	7' 5"
Tread	84"
Tire Size (Standard) Rock Grip	18.00 x 25—20 Ply
Brakes	Air-Operated from Tractor Brake Controls
Wheelbase	20' 5 1/2"
Weight, Shipping, Trailer and Hydraulic Control System (Approx.) Pounds	15,000

Rubber-Tired Trailers



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FORCED-TRAX TRAILERS



RUBBER-TIRED TRAILERS

Bridge Approaches Are Built by Dredge

Hydraulic-Fill Embankments Placed to Maximum Height Of 30 Feet With Diesel Dredge Monroe

AT the northeastern tip of Florida, State Route 200 provides the only access to offshore Fernandina Island by means of a bridge over the Amelia River, which at this point serves as the inland waterway along the Atlantic Coast. The east-west state road ties in to U. S. 17, the Coastal Highway, at Yulee, Fla., about 7 miles west of the bridge. This old, narrow, timber-bent bridge is 300 feet long and has a swing span at the center. The State Road Department of Florida is now about to replace it with a modern concrete-and-steel structure which will have a double-leaf bascule span over the channel.

But before the bridge can be built, approach embankments first had to be placed to a maximum elevation of 30 on both sides of the new span which will have a horizontal clearance of 90 feet. With a height affording a minimum vertical clearance of 20 feet even at high water, the bascule span will not have to be raised for many boats. The present draw span is so low that it must be raised for practically all traffic on the waterway.

The State Road Department awarded a contract for the approach embankments, totaling a mile in length, to B. B. McCormick & Sons, Inc., of Jacksonville Beach, Fla., on its low bid of \$257,838. The embankments were constructed with hydraulic fill by The Arundel Corp. of Baltimore, Md., which had its diesel-powered dredge Monroe on the job. The prime contractor will pave the approaches for a 24-foot width with an 8-inch lime-rock base, surface-treated with slag and asphalt.

Sand Embankment

Since the only access to Fernandina Island, located in Nassau County, is by State Route 200, the existing bridge remained in operation while the new fills were placed about 150 feet south of the original highway. About two-thirds of the job length is on the west approach. The east fill, comprising the remaining one-third, was done first. With these approaches, the new bridge will naturally be a good deal shorter than the original timber-bent structure.

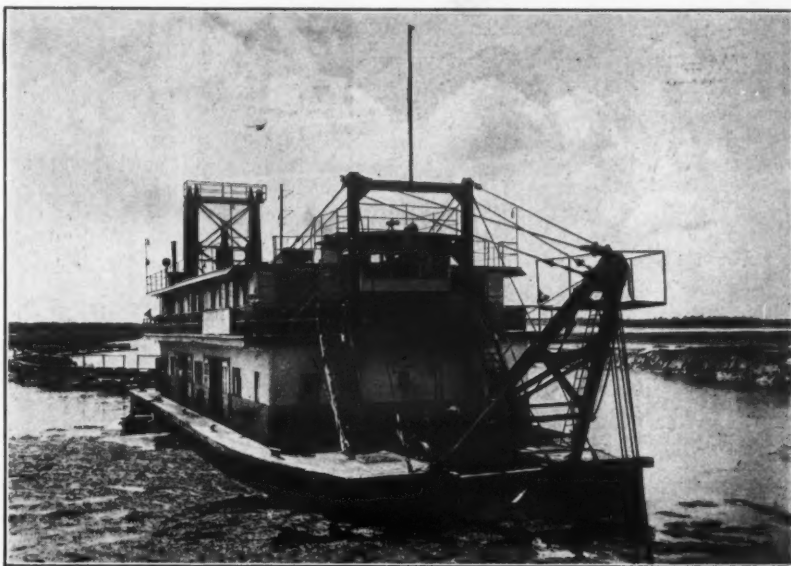
The approaches to the old bridge over the marsh had become rough and uneven due to settlement of the muck below, which proved to be a poor foundation. Before the new fills were made, this swamp muck was first excavated down to sand over the new location. This cut, over an average 125-foot width, was about 12 feet deep; a few locations had as much as 18 feet of muck. But all the muck was removed to avoid future settlement of the new approaches.

Excavation of the muck, which totaled 171,000 cubic yards, started in September, 1947, and took 2½ months to complete. Then work began on the sand embankments which were completed

last May. The approaches, of course, will not be used until the bridge is completed at some future date. George D. Auchter Co. of Jacksonville, Fla., will construct the bridge.

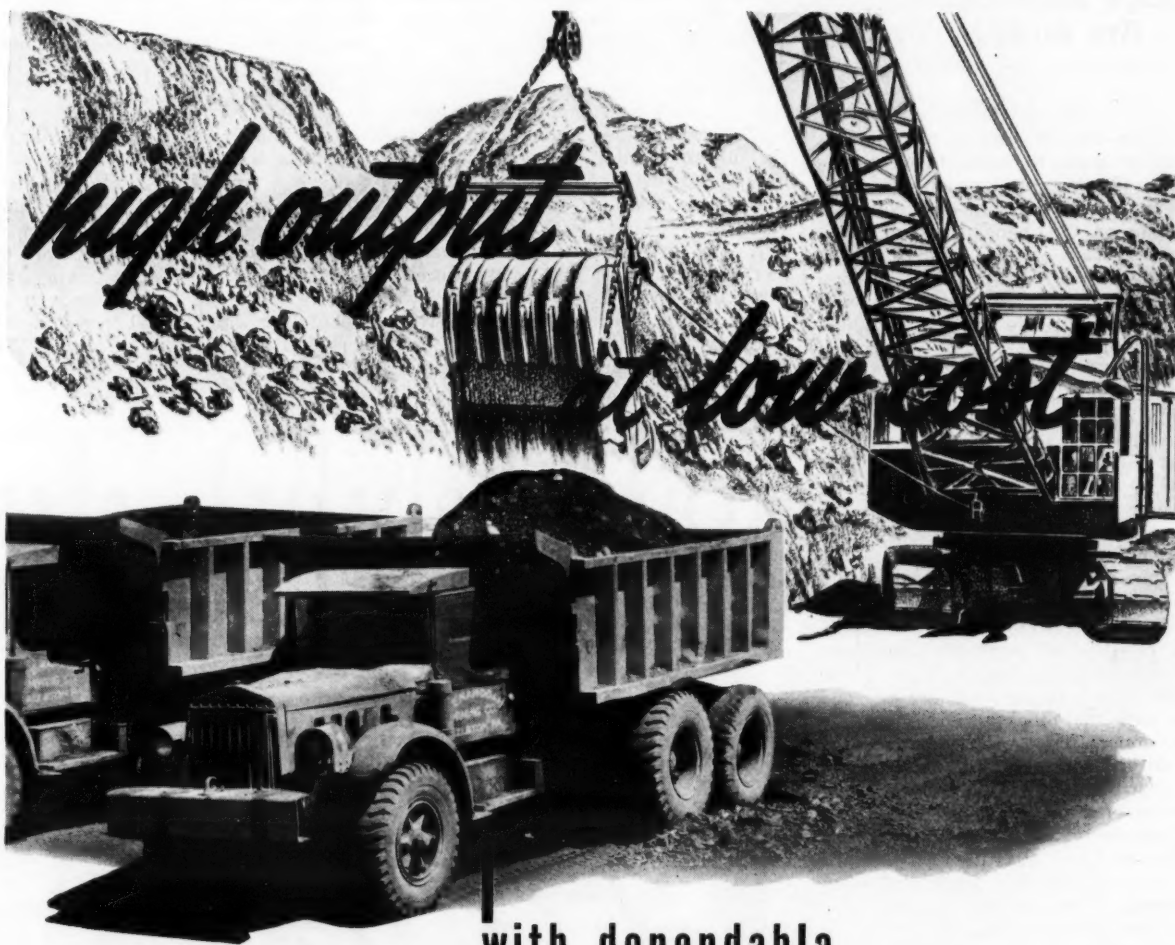
The muck was pumped out by the dredge Monroe, which has an 18-inch intake and a 16-inch discharge line. It was spoiled over the adjoining marsh, so only 400 to 500 feet of discharge pipe was required, both floating and land lines. Sand for the fills came from two borrow pits, one on each side of the road, averaging about 10 acres each in area. To reach the borrow pit on the north side of the road, the dredge dug a canal 1,200 feet long, about 125 feet wide, and 7 feet deep. Most of this material was usable in the fills.

(Continued on next page)



C. & E. M. Photo

The Arundel Corp.'s diesel dredge Monroe, shown here on a bridge-embankment job in Florida, has a 50-foot ladder on her bow, supported from a 3-foot A-frame.



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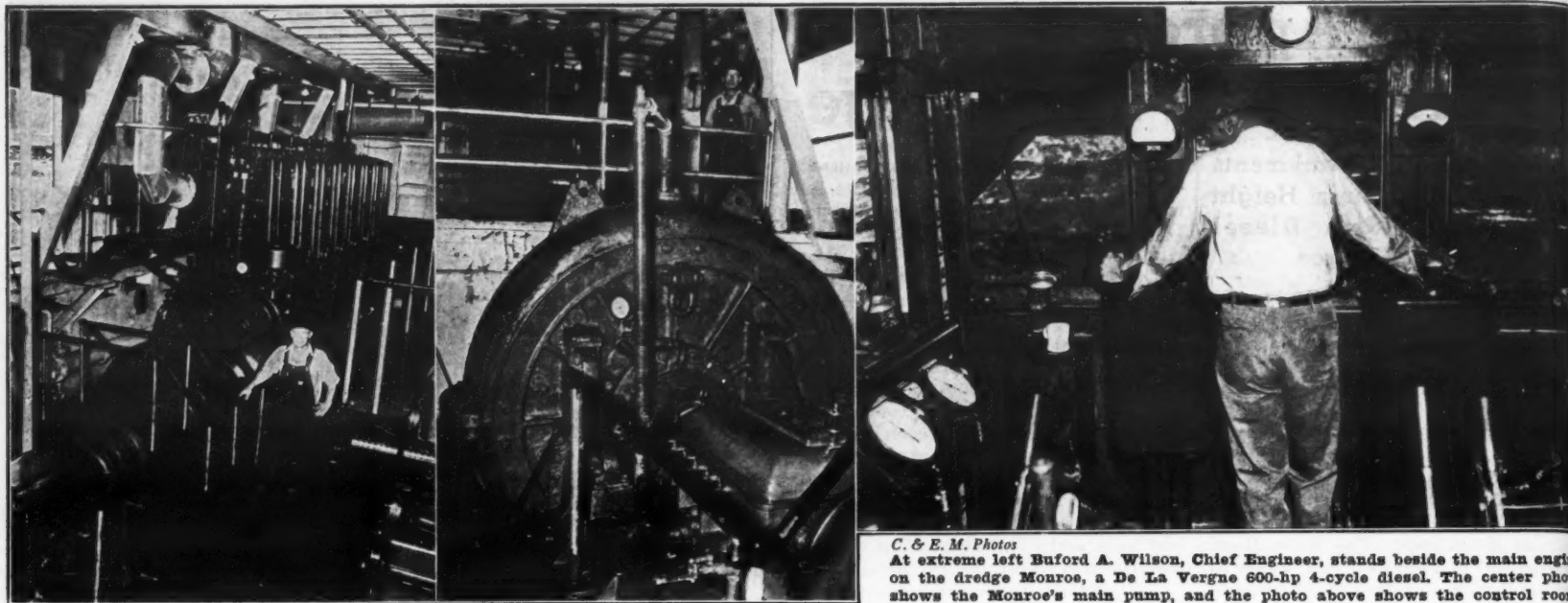
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C. & E. M. Photos

At extreme left Buford A. Wilson, Chief Engineer, stands beside the main engine on the dredge Monroe, a De La Vergne 600-hp 4-cycle diesel. The center photo shows the Monroe's main pump, and the photo above shows the control room.

Bridge Approaches Are Built by Dredge

(Continued from preceding page)

Varied Material

In the borrow pits three different kinds of suitable material were encountered. A typical cross section of the bank indicated a 2-foot layer of hardpan on top, beneath which lay a 4-foot stratum of marl, with sand the rest of the way down. The elevation of the ground in these pits was around 5.0, and the dredge excavated to approximately minus 20. This meant a 25-foot cut into the bank.

The specifications and plans called for building the approach fills to a maximum elevation of plus 30 at the abutment ends of the embankments. This vertical lift was frequently made through a 3,000-foot discharge line. Close to the bridge site the side slopes of the fill are 6 to 1. Farther back where more space is available, they gradually flatten out to 10 to 1. On top, the embankments are wide enough to accommodate a 24-foot pavement flanked by 8-foot shoulders. The shoulders, which slope $\frac{3}{4}$ inch to the foot, are covered with an 8-inch muck blanket as are the side slopes. This will not only hold the sand in place but will also promote the growth of grass or vegetation, and prevent erosion either from the wind or from the water.

The sand was next pumped into the cut from which the muck had been removed. If any muck remained after the first dredging operation, it was forced out of the hole by a squeezing action when the heavier, more solid sand was discharged on top of it. The total amount of embankment required was 352,000 cubic yards.

Retaining Dikes

To build up the fills to the proper elevation and gradient, retaining dikes were necessary. The dikes were constructed 6 to 8 feet high with the sand that had already been pumped into the hole from which the muck had been removed. A Northwest dragline with a 40-foot boom and a 1-yard bucket threw up the dikes along each side of the fills in approximately 500-foot sections. Other dikes were also built at each end of the section to prevent loss of material. Water from the hydraulic fill ran off through a pipe spillway which was built up higher during the placing of each successive lift.

When the pumped sand had reached the top of the first double row of dikes, dredging was shut down until new dikes were built. Then it was resumed, with the cycle continuing until grade was reached. A Caterpillar D7 tractor-dozzer assisted with the grading and shaping. Most of the long sections were pumped at a slightly down-hill gradient; and

when they were filled to a horizontal level, the dozer put on the final grade conforming with that of the rest of the embankment profile.

The dredge pumped as much as 800 cubic yards per running hour. With big lags in dredging time due to building dikes, cleaning and shifting pipe lines, and now and then removing a stump from the line, the average excavation was around 8,000 cubic yards a day. The dredge worked 24 hours a day, 7 days a week, employing a crew of around 40 which was broken up into 8-hour shifts. When the dredge was working the north borrow pit and depositing the material on the east em-

bankment, the discharge line ran through a culvert under both the Seaboard Railway lines and the state highway.

Dredge Monroe

Built in 1924 by the Ellicott Machine Corp., Baltimore, Md., the dredge Monroe has a wood hull made of pine, 5 inches thick including the sheathing. It is 110 feet long, 34 feet across the beam, and 8 feet deep. The two-deck superstructure is painted grey and white. From the bow extends a 50-foot ladder weighing 50 tons and supported from a 30-foot A-frame. With this ladder the dredge can dig to a depth

of 30 feet, but that maximum was not used on this particular job. At the end of the ladder is the 5-blade 64-inch-diameter cutter head of the basket type which is used when dredging sand or softer material. In hard digging a cutter head with teeth is substituted, and when this is in service the teeth are given a new edge of hard facing every 15 to 20 days. This work is done in the company's shop at Stuart, Fla., farther down the east coast. A spare cutter head is brought to the job by truck, while the one in need of service is hauled away to the shop.

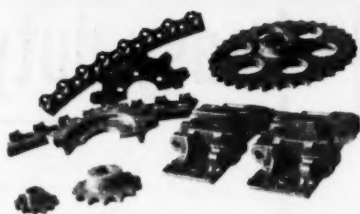
The intake line, an 18-inch pipe run-

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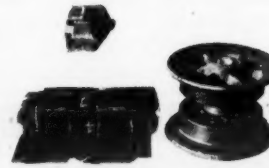
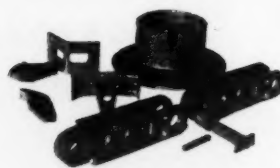
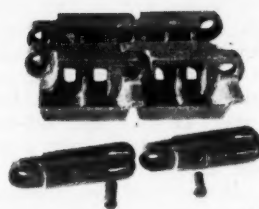
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ning up the ladder from just behind the cutter head, has a 12-foot-long rubber connection where it leaves the ladder for the dredge. Inside the hull, the pipe makes some sharp bends with elbow joints so as to get back to the main pump which lies just starboard of the dredge center line. The pump and the main engine are in a line, while the electric generator engine is placed just to port of the dredge center line, thus balancing the weight of the dredge equipment.

The pump has an 18-inch intake and a 16-inch outlet which leaves the pump on the port side, ascends from the hold to the main deck, makes a left-handed turn, and continues to the stern. There it leaves the dredge to become the floating line. On the dredge the outlet pipe runs along the deck outside the housing.

Diesel-Powered

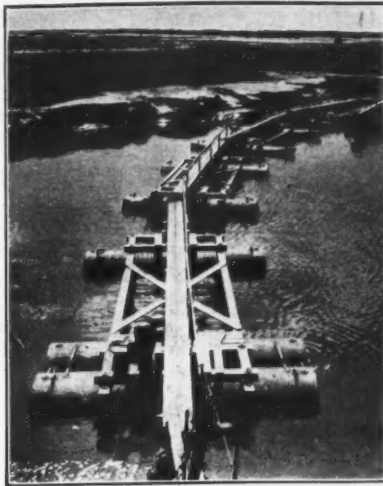
Driving the Monroe is a De La Vergne 600-hp Model VG 4-cycle diesel engine which turns 260 rpm. This engine is directly connected to the main dredge pump on a 6-inch drive shaft with flexible coupling. The dredge pump is of Arundel design and construction, with a three-vane 67-inch impeller and 14-inch runner. Across on the other side of the hold is a Fairbanks-Morse 360-hp 2-cycle diesel engine which charges a General Electric 200-kw generator. The latter unit furnishes power and light for the entire dredge. Both diesels are started with the help of a Quincy $3\frac{1}{2}$ x 3-inch air compressor.

The larger engine runs only the suction pump, while the generator driven by the smaller diesel furnishes power for a G-E 100-hp cutter-head motor, a Westinghouse 30-hp hauling-gear motor, and for twelve other electric motors ranging from 5 down to $\frac{1}{2}$ hp. These motors have various uses, from operating water pumps to maintaining the refrigeration system where the Monroe's meat supply is stored, or running the electric water-cooler fountains. For the Monroe houses and feeds its crew, averaging 35 men. A Crane oil burner fires the hot-water circulating-heat system on the dredge.

As a stand-by unit, a Superior 60-hp diesel engine drives a Westinghouse 50-kw generator to supply light for the dredge in case of trouble with the normal source. The lighting is on a dc 220-volt line.

Operating Equipment

The cutter-head motor is located on the forward deck at the end of the ladder, while the hauling-gear motor is within the deck house up forward. The



C. & E. M. Photos

From the stern of the dredge Monroe we can see the 16-inch floating discharge line (at left) resting on cylindrical pontoons. Above, the land line discharges embankment material for the east approach of the bridge which will be built at some future date over the Amelia River in Florida.

latter motor is hooked to a big bull wheel, part of the Ellicott 5-drum cross-deck gear. The center drum raises and lowers the ladder; the two adjoining drums are for the swing line; and the

two outer drums are for the spuds. Power for these motors is transmitted from a switchboard placed crosswise of the dredge behind the two big diesel engines.

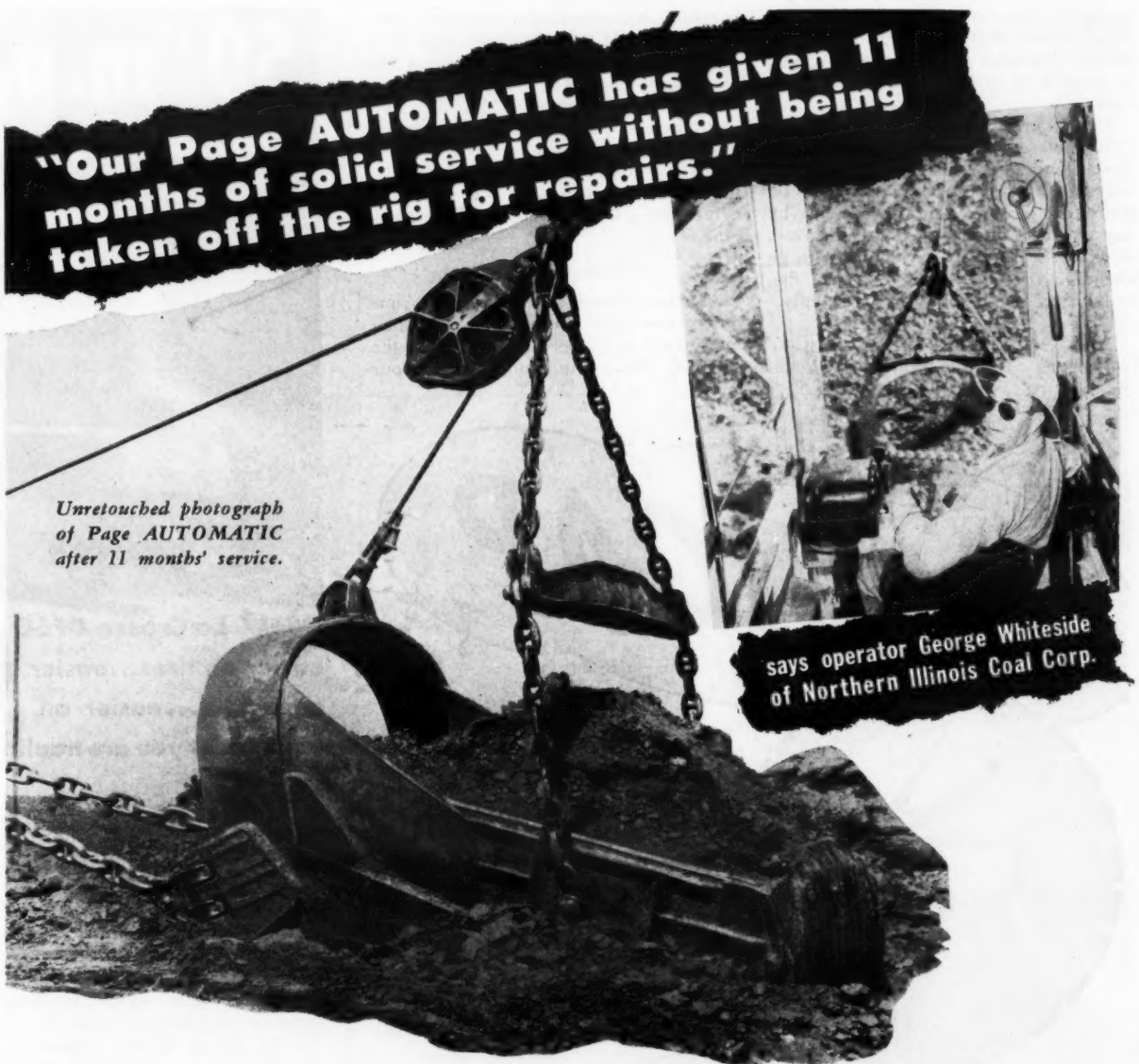
The 1-inch swinging wire has a total length of 400 feet, but on this job the practical swinging distance was around 200 feet. When the dredge is near

(Continued on next page)

"Our Page AUTOMATIC has given 11 months of solid service without being taken off the rig for repairs."

Unretouched photograph of Page AUTOMATIC after 11 months' service.

says operator George Whiteside of Northern Illinois Coal Corp.



"THAT'S real performance in anybody's language and a record that helps us get top yardage consistently day after day.

"I've operated Page buckets for twenty years . . . everything from small ones right up to this 30-cubic yard AUTOMATIC and they just can't be beat. I always get full loads within 2 to 3 bucket lengths without any recasting or jockeying for position. There is no spillage or windrows and the AUTOMATIC is easy on the cable which means no fairlead chatter.

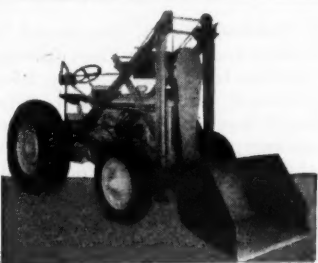
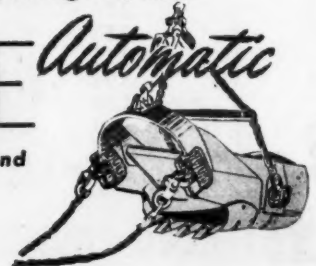
"All in all, the AUTOMATIC does a fine job . . . a full load every minute and at the end of the day, I'm not tired out from wres-

ting the bucket to keep my quota up to par."

Whether you use a $\frac{3}{8}$ -yd. or a 30-yd. AUTOMATIC, or any size in between, you can dig more yards at a lower cost per yard than with any other bucket you ever used.

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ELKHART

INDIANA

Bridge Approaches Are Built by Dredge

(Continued from preceding page)

shore, deadmen of logs up on the bank are used as ties for the swing line. Otherwise 1½-ton anchors are hooked to the line and then dropped in the water.

In outside hull wells at the stern are hollow steel spuds with the walls nearly an inch thick. They have a 24-inch diameter and are 60 feet long. The port spud is generally used for digging.

Control House

Up in the control or leverman's house in the bow are two Westinghouse control boxes for the operation of the cutter-head and swing motors. There, too, are the ten levers for the hauling gear—a switch and brake for each drum. The depth at which the cutter head on the ladder is digging is indicated on an inside gage which is rigged up to a ¾-inch cable that runs out on the ladder. Two of the most important instruments are gages for the vacuum, which on this job averaged 15 inches, and for the discharge pressure, which generally held to around 45 or 50 pounds per square inch.

Since there is no telephone communication between the dredge and the shore crew handling the discharge line, manual signals are used by the men on shore. To stop dredging, a red flag by day or a red lantern by night is waved. A white flag or lantern signifies to go ahead and dredge. One of each, flag or lantern, means to pump water only.

Other Equipment

Above the machine room and extend-

ing forward over the pump is a double overhead track for carrying different sizes of hoists. Pump parts are lifted with a Yale 5-ton hoist. A Cyclone 2-ton hoist is generally used for lifting off the manhole lid at the trap in the line directly in front of the pump. Stumps or other obstructions are thus removed before they can damage the pump.

Just behind the swinging gear are some essential machine-shop tools including an 18 x 42-inch lathe, a Barnes vertical drill press, a 16-inch power hacksaw, and a 12-inch emery wheel.

The Monroe has a capacity of 4,600 gallons of diesel fuel oil which, on this job, was supplied from the Standard Oil Co. docks at Jacksonville, Fla., 45 miles distant. The dredge tanks hold 2,400 gallons of fresh water, and this supply was easily replenished from an artesian well on shore, less than ½ mile from the center of the project. A small float carrying a 700-gallon tank was towed back and forth from dredge to well where the water was pumped out with an electric pump.

For shifting anchors and moving or handling equipment, the Arundel Corp. has an 80 x 25 x 6-foot wood-hull derrick barge. The hoisting rig has a 45-foot boom, and its drums are powered by a Le Roi gas engine. Materials and equipment are stored on a wood supply barge, 90 x 30 x 6 feet. The only self-propelled vessel on the project was the tugboat Captain Jim, 38 feet long and driven by a Cummins 90-hp diesel engine.

Pontoon Line

As the 16-inch discharge line runs down the port side of the Monroe's main deck, it makes a sharp turn at the stern to leave the Monroe with four



C. & E. M. Photo
Meet Fred I. Davies, Captain of the dredge Monroe and Superintendent for the Arundel Corp. on the Florida bridge-embankment contract (left), with Buford A. Wilson, Chief Engineer of the Monroe.

swivel joints at the connection. This permits an angle of about 30 degrees. Then the discharge line becomes the pontoon line. The 45-foot lengths of steel pipe are connected with ball joints, and each section of pipe is floated on

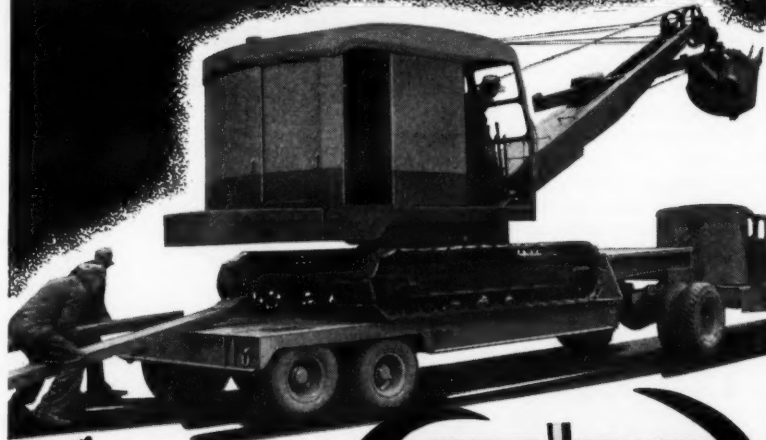
two cylindrical pontoons located 5 feet back from each end of the pipe. The pontoons are tanks 18 feet long x 3 feet in diameter. For the first pontoon section leaving the dredge, dual cylinders were employed.

The pipe was firmly secured to the cylindrical tanks with a 12 x 12 on each side of the tank, and another 12 x 12 strongback on each side of the pipe, paralleling the line. Straps went around the tanks and were bolted to the strongbacks with U-bolts. This wooden frame also supported a 20-inch-wide catwalk out over the line. The walk was made of two 10-inch boards with a guardrail of 2 x 4's along one side.

On land the 16-inch pipe line was in 16-foot lengths, with slip joints used for the connections. The pipe was placed right on the land, and the discharge end on the beach had a spreader or baffle board to slow down the rate of discharge flow and thus induce the material to settle.

On this job the total length of line (Concluded on next page)

50 m.p.h. HAULS Without excessive tire wear!



New LaCrosse DF6C
easier on tires...easier
on frame...easier on
equipment you are hauling

THIS new LaCrosse spring-mounted tandem axle trailer lets you move big loads at 50 m.p.h. — with no more tire wear than you get at 20 m.p.h. with ordinary, solid axle trailers. Lessens hazards of overloading... permits more trips per day at higher profit for you. Also eliminates punishing jolts when loading crawler equipment. Choice of 19, 24, 27 or 33-ton capacities... flat, drop or low-drop models... all necessary accessories.

Spring-mounted for a Smooth Ride

2 H-beam axles, supported by 2 heavy-duty alloy steel springs, cushion road shocks, keep DF6C platform and equipment riding level over bumps. Axles and springs, connected by double Y-shaped brackets, absorb brake torque and assure positive wheel alignment at all times. LC-1



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... Just slip the "RAINCAP" over the open end of your tractor exhaust, and you eliminate forever the danger of moisture falling into the exhaust, injuring your tractor.

THE CAP THAT DOES NOT FORGET TO CLOSE... Completely automatic—the "RAINCAP" is counter-balanced to open when the tractor starts and close when it stops. Rust proof—made of cast aluminum with bronze bushing—can be installed in two minutes. F.O.B. Waterloo, Iowa.

Write Dept. C-1
Immediate delivery
Liberal dealer discount

No.	O.D. Exhaust	Retail
1	2 1/8"	\$1.90
2	2 3/8"	1.90
3	2 3/4"	1.90
5	1 7/8"	1.90
55	2"	1.90
5x	1 3/4"	1.90
6	1 1/2"	1.90
66	1 3/8"	1.90
7	2 1/2"	1.90
8	3"	2.50
9	3 1/8"	2.50
10	3 1/4"	2.50
11	3 1/2"	2.75
115	3 3/4"	3.00
12	4"	3.00
123	4 1/8"	3.00
125	4 1/4"	3.00
14	4 1/2"	3.00

WATERLOO FOUNDRY CO., WATERLOO, IOWA

for the discharge of hydraulic fill was 3,500 feet. The pontoon line varied from 100 to 1,200 feet in length. The greatest amount of land line strung out touched 3,000 feet.

Quantities and Personnel

The major items on this mile-long hydraulic embankment job to be paved with a lime-rock base included:

Muck excavation	171,000 cu. yds.
Embankment	352,000 cu. yds.
Ocala rock base	13,642 sq. yds.

The Arundel Corp. was represented on the project by Captain Fred I. Davies, Superintendent of the contract and Master of the Monroe, with Buford A. Wilson, Chief Engineer. For the Florida State Road Department, W. M. Cook was Inspector on the dredge. The contract is located in Division 2 which is headed by John R. Slade, Division Engineer. F. Elgin Bayless is Chairman of the State Road Department, and E. C. DeGarmo is State Highway Engineer.

New Hampshire Reports

On Winter Maintenance

During the winter of 1947-48, the New Hampshire State Highway Department spent \$1,480,267.25 for winter maintenance on 3,124.89 miles of state highway system. This expenditure was divided as follows:

Item	Cost
Chlorides for sand	\$ 23,813.68
Chlorides for ice prevention	268,389.70
Spreading chlorides	135,510.46
Sanding	238,777.78
Plowing	709,058.29
Snow fence	62,394.51
Night weather patrol	42,322.83
Total	\$1,480,267.25
Miles	3,124.89
Cost per mile	\$473.70

Weather conditions in the state last winter were very severe. The "Climatological Data" reports of the U. S. Weather Bureau show a total average snowfall there of 97.6 inches. This was 7.7 inches above the average for the preceding ten winters, and 9.5 inches above that of 1946-47. Monthly temperatures averaged above normal in October, March, and April. But November, December, January, and February showed averages below normal of 1.9 degrees, 2.9, 5.0, and 3.3 degrees respectively.

Equipment Used

In dealing with last winter's snow and ice problem, the Highway Department used the following equipment:

State-Owned Trucks	
2 to 2½-ton	3
3 to 4-ton	28
5-ton and over	12
Total	43
Hired Trucks	
1½-ton	153
2 to 2½-ton	78
3 to 4-ton	34
5-ton and over	31
Total	296
Grand total of trucks used—339	
Plows	
One-way spinner	304
Reversible	28
V-type	25
Rotary	1
Total	358
Other Equipment	
Wings	287
Sand spreaders	284
Motor graders	6
Tractors	1
Snow fence	1,000,374 lin. ft.

Materials for ice control included 41,456 cubic yards of sand, 15,421 tons of sodium chloride, and 253 tons of calcium chloride.

Night Weather Patrol

The record of the night weather patrol was as follows:

Item	Total
Number of nights operated	126
Patrolmen called	1,508
Number of nights called	41
Night patrolmen employed	147
Motorists assisted	313
Total N. H. cars	247
Total foreign cars	66
Number of nights assisted	29

Movie Depicts Earth-Mover

A movie on job applications of the TS-300 motor scraper has been made available by LaPlant-Choate Mfg. Co., Inc., 2920 First Ave., Cedar Rapids, Iowa. Entitled "Profit Report", this 16-mm sound and color film describes various operations to which the high-speed rubber-tired TS-300 is adaptable. The film is available for loan or it can be viewed at the headquarters of LaPlant-Choate distributors.

Materials-Testing Service

William Furber Smith has joined the United States Testing Co., Inc., of Hoboken, N. J., to organize a new engineering inspection service for building and building material. He plans to create a field organization of specialists in concrete batching and placement, steel fabrication and erection, piling and wood preservation, bituminous road materials, and other phases of construction.

Get All the Lubrication Good Oil Provides!

WGB Clarification Assures Lower Lubrication Costs—Longer Engine Life

AND HERE'S WHY: Intensive laboratory tests prove that correctly processed, properly formed and adequately supported, fine cotton is the most efficient filtering medium for all kinds of oil. Further, WGB Clarification thoroughly cleans the oil—without removing essential additives or other lubricating qualities. The WGB Cartridge outlasts other types by a ratio of 2 to 3 . . . cuts engine repairs to a new unheard-of low—and can be changed without tools! Get to know the advantages of WGB Clarification.



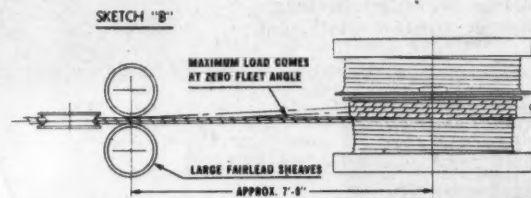
W. G. B. Oil Clarifier, Inc.

139 Cornell St.
Kingston, N. Y.



1. Proper fleet angle is an important factor in cable life: the smaller the angle, the less the wear on cable by flanges of the sheave. Sketch "A" at right, shows a common method of cable reeving where large fleet angle and piling at maximum load cause excessive cable wear. Sketch "B" shows the LIMA method, achieving small fleet-angle—with zero angle at maximum load, by proper placement of drum with relation to fairlead and large diameter drums with short traverse. Cable wear is further protected by large, deep throated sheaves and grooved drums.

1. SMALL FLEET ANGLE OF THE FAIRLEAD CABLE MEANS LONGER LIFE AND LESS DOWN TIME

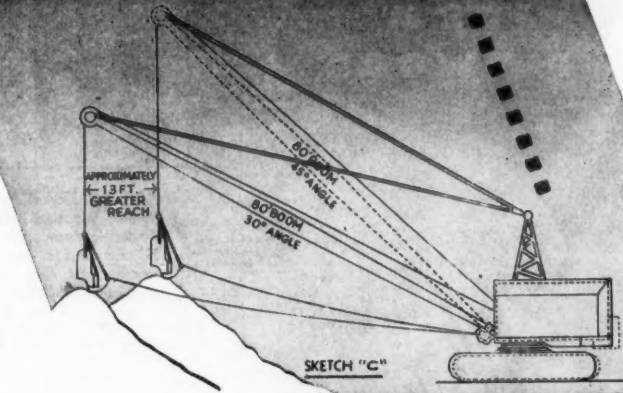


2. Sketch "C" illustrates how a well balanced LIMA dragline with 80 foot boom, working at 30° angle, achieves 13 feet greater reach than a light weight machine with same length boom, but which cannot go lower than 45° without tipping.

LIMA draglines have low center of gravity, proper weight distribution and long wide crawlers—all contributing to lower possible work angle of boom and greater working ranges.

LIMA draglines are designed and built for dragline work. Every part is engineered for greatest output with minimum maintenance. Sizes and capacities for practically every requirement. Get all the facts before you buy your next dragline . . . LIMA also makes power shovels from ¾ to 6 yards and cranes from 13 to 100 tons.

2. LOW WORK ANGLE OF THE BOOM MEANS GREATER WORKING RANGE AND INCREASED OUTPUT



Lima Shovel and Crane Division

LIMA, OHIO

OTHER DIVISIONS: Lima Locomotive Works Division; Niles Tool Works Co.; Hooven, Owens, Rentschler Co.





The Prehy concrete gun places cement mortar under pressure and can also be used for dry or wet sand-blasting operations when equipped with a special nozzle.

Pressure Placement Of Cement Mortars

Equipment for the pressure placement of cement mortars has been developed by The Prehy Co., Inc., 420 Lexington Ave., New York 17, N. Y. The Prehy equipment can also be used for dry or wet sand-blasting operations when it is equipped with a special nozzle. The charging unit has a tank capacity designed to permit continuous charging at rates up to 50 or 60 cubic feet of material per hour. This results in the placement of approximately 2 cubic yards of Guncon mortar per hour, the company explains.

The charging chamber is divided into two sections—one for discharging the mixed materials, and another to permit filling during placement operations. When the lower chamber empties, additional material is dropped into it from the filled upper chamber. The manufacturer states that the construction of the feed wheel results in positive and even flow of material through the discharge line, and that this machine is not sensitive to varying moisture conditions.

The cement-and-sand combination is forced to the gun nozzle by a stream of compressed air. A controlled spray of water is introduced to the mixture at the nozzle by means of fine jets. The nozzle is made of magnesium, and has a replaceable rubber liner. The concrete gun unit stands 50 inches in height and 30 inches in greatest width, and

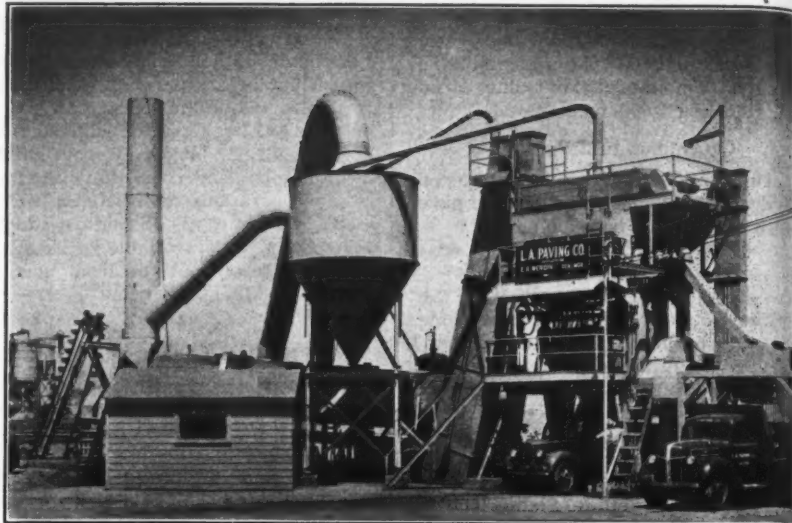
weighs approximately 750 pounds. Discharge lines are 1 1/4 inches in diameter. Operating pressures vary between 30 and 80 pounds.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 51.

Lewis and Browning Merge

The Lewis Mfg. Co. and the Browning Mfg. Co. have merged their businesses and will operate under the firm name of Lewis-Browning Mfg. Co. Offices and factory are located at 111 Humble Ave. in San Antonio, Texas. Officers are: James E. Browning, President; Wilson Lewis, Vice President; H. W. Lewis, Secretary; and A. D. Kindig, Sales Manager.

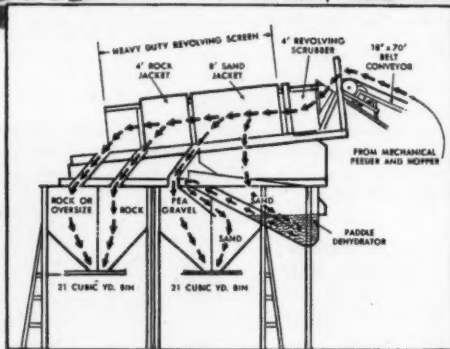
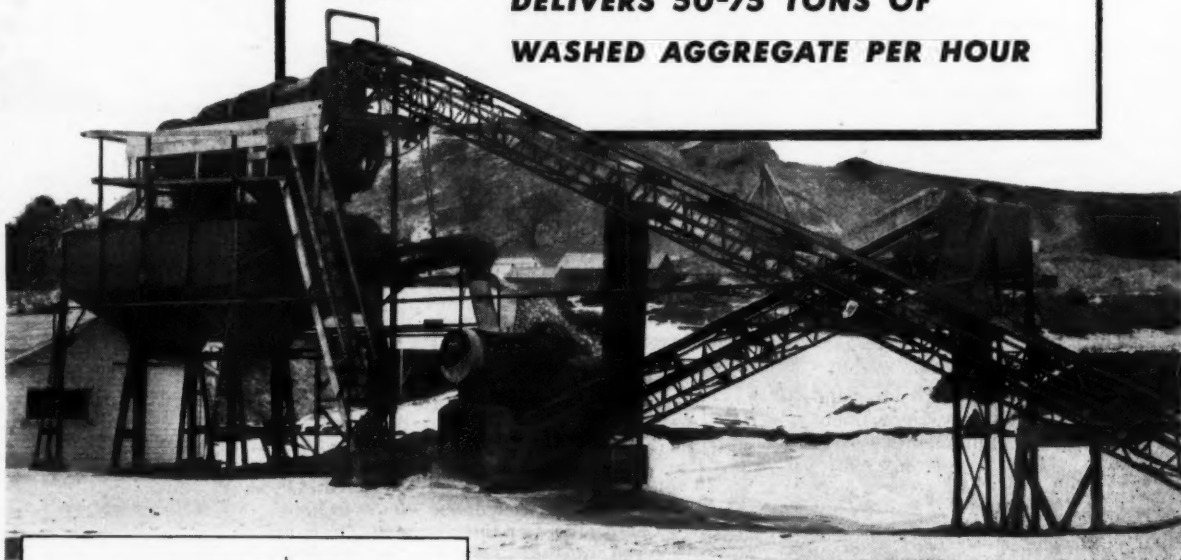
The new company will continue to manufacture the Pierce Bear line of tandem rollers, and the BMCO pneumatic-tire and sheepfoot rollers. Dealer arrangements are being made to consolidate the two lines; some territories are still open.



Dust-free operation makes this Madsen 4,000-pound asphalt plant an acceptable neighbor in Los Angeles, where it is set up. It has a 6 x 28-foot drier and a dust-collector unit consisting of a 12-foot-diameter cyclone and an 80-4 exhaust unit. And it is complete with a pit-type bunker with a concrete underground tunnel and conveyor-feed arrangement.

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Construction Safety Discussed at Meeting

Importance of Planning For Job Safety Stressed at National Safety Congress; New Officers Elected

PLANNING for safety in construction was the general theme of the Construction Section meetings at the National Safety Congress in Chicago during October. The record attendance of about 250 at the two sessions included contractors; their safety engineers, superintendents and foremen; government-agency safety engineers; and representatives of manufacturers, public utilities, insurance companies, and one state highway department.

Frank J. Crandell, Assistant Vice President of Liberty Mutual Insurance Co., Boston, who served as General Chairman of the Section during the past year, opened the proceedings with his annual report. He pointed out two major accomplishments for the year: closer cooperation has been achieved with other construction-industry organizations in the effort to promote safety programs; and more helpful material has been made available to members.

In the 15 years of an active accident-prevention program, Mr. Crandell said, the compensation rate has been reduced 50 per cent, better inspection has been achieved, and more thought has been given to the proper guarding of the moving parts of equipment. Accident prevention is a perpetual job, he stated, and we are now in that stage of development where the emphasis must be put on planning for safety.

Planning Safety for a Job

Accordingly the feature of the first session was a panel discussion on how to plan a construction job to insure its safe operation. Participants were Gerard O. Griffin, Safety Director of the Dravo Corp., expressing the point of view of the company safety director, who coordinates several projects; F. C. Wardwell, Project Manager, Stone & Webster Engineering Corp., Whiting, Ind., speaking as the job project manager; and J. A. DeLuca, Division Superintendent, E. I. du Pont de Nemours & Co., Inc., representing the safety engineer on the job.

Mr. Griffin defined his job as safety director as one of initial planning and overall supervision of all safety activities of a company. In this capacity, he is asked for a safety and health estimate at the time bids are being prepared. To make such an estimate, it is necessary to know the approximate cost of the job, the approximate number of employees, and the time allowance. He must check on the workmen's compensation laws in the state where the work is to be done, the safety laws, fire and explosives laws, and sanitation regulations. He must review the specifications for safety clauses. He must consider the insurance premiums required to provide coverage for the approximate man-hours involved, and he must decide whether the project is large enough

to warrant a full-time safety engineer, or whether a safety supervisor, covering several jobs, will be able to handle the safety program on this one.

Then he must find out the distance to the nearest hospital and other medical services, to determine the medical needs of the job—whether or not a field hospital will be required, with a doctor or just a nurse in attendance, how many first-aid stations, etc. Finally, he must estimate the amount of personal protective equipment needed. Then he makes his safety and health estimate.

When the contract is awarded, he reviews the plans and specifications, looking for hazards. He also reviews the plans of the contractor for doing the job—plant layout, general procedure,



"Accidents on Trial" was one of the panel discussions at the Construction Section meeting at the National Safety Congress. Left to right are George D. McCeney, who described the accidents; and Frank J. Crandell, Charles G. Davis, and Joel Bloomquist, who analyzed the accidents from the points of view of a safety engineer, a contractor's superintendent, and an insurance-company claims man respectively.

etc. He must find out about weather and geological conditions. He also looks into the matter of job personnel. The general superintendent is the key

to a safety record, but much of his responsibility must be delegated to assistants, so the safety director finds out
(Continued on next page)



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Construction Safety Discussed at Meeting

(Continued from preceding page)

who they are to be. He must consult the insurance company servicing the job, and select his own safety and medical personnel.

With his own general plans in mind, the safety director confers with the general superintendent and discusses with him personnel, his plan for the operation of the job, and the progress schedule. Mr. Griffin believes it is equally important to outline his plans for a safety program to the superintendent and to secure the superintendent's approval of his choice of safety engineer.

Regular reports from the safety engineer or supervisor covering the project must be arranged for, and check visits to the work must be made by the safety director. And finally, Mr. Griffin emphasized, special attention must be paid to safety in closing out a job. Many a project has been carried to completion with an excellent safety record, only to have a bad accident while moving the equipment off the job.

The general superintendent may look on this job planning from a different point of view, said F. C. Wardwell, speaking as a project manager. The superintendent is on the job to get it done and make money for the contractor. Since he is completely responsible for everything on the job, he has a great many details to consider, and sometimes safety doesn't seem the most pressing one. But suddenly, there's an accident—and then accident prevention becomes paramount.

In this matter of safety, Mr. Wardwell said, the most obvious benefit is in the insurance rate, but it is not the most important. A safe job is a well kept economical job. Look at any job gone sour, he suggested—a job which is losing money and is behind schedule—and you will usually find that it is an unsafe job as well. The same kind of planning goes into safety as goes into other job details. This planning should have two objectives: (1) to maintain the best safety record consistent with the hazards of the job; and (2) to maintain safety economically.

In order to present his safety program to the superintendent in terms of costs, the safety engineer must know costs of all types, Mr. Wardwell said. And he must see that the superintendent knows about the costs of these safety items. Most important, the safety engineer must know the job. The four general principles of a safety program—good housekeeping, equipment inspection, protective equipment, and safety meetings—must be adapted to the job conditions, he said.

In Mr. Wardwell's opinion, safety should not be left entirely in the hands of the safety engineer. The superintendent should work with him, especially in the early stages of the job, when operations, the selection of equipment, and the progress of the work are being determined. In such discussions, the safety engineer can learn much about how the job is to be run, and the

superintendent can profit from the safety engineer's suggestions.

Mr. Wardwell believes that most superintendents are interested in the safe operation of a job; that they realize their own limitations, and therefore welcome the chance to turn over to a competent safety engineer the task of keeping a job accident-free.

J. A. DeLuca outlined the duties of the safety engineer on the job. These include a study of both site and scope of the project, of the number of men and the various crafts to be employed, and of any special hazards of the job. The extent and kinds of construction equipment must be determined, in order to anticipate their inspection, control,

and safe operation. Protective equipment, facilities, and services must be ordered, in amounts sufficient to meet the needs of the job but not in excess of them.

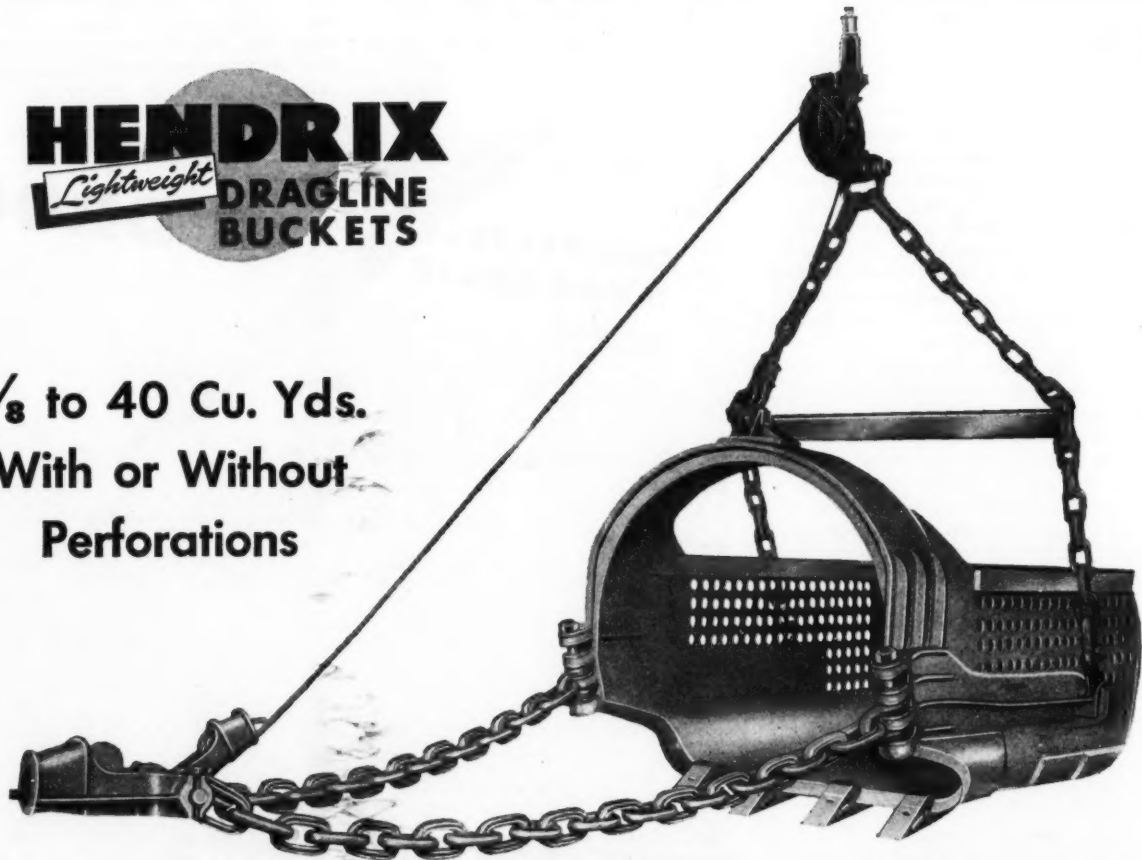
One of the most important early tasks of the safety engineer is to know the supervising personnel on the job, in

(Continued on next page)

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order to find out which ones are "with him" and where he will have to make special effort to secure cooperation.

Job safety committees must be set up, safety meetings planned, training programs arranged, and the plans for the operation of the job discussed with the engineers and superintendent. The biggest part of the safety engineer's job must be done in the first 30 to 60 days of the contract. When the work is launched, his task then continues with daily inspection to all points where men work, and constant cooperation with the superintendent and other supervisory personnel. Since most of the safety work he outlined is done at the start of the job, an entire re-analysis of requirements and a strengthening of each item are necessary at regular intervals, to fit the program to the evolution of the work and to insure universal understanding at all levels of workers and supervisors.

Equipment Inspection

Final speaker at the first session was Frank J. Cadin, a mechanical engineer by profession, formerly with the Walsh Construction Co., and now with Eagle-Globe-Royal Indemnity Co. of Buffalo, N. Y. The title of Mr. Cadin's talk was "An Equipment Inspection and Maintenance Program Is Necessary". He pointed out that such a program will cut costs and delays and reduce accidents. If properly planned, it will not increase operating costs. And it will result in better labor relations, higher morale, and therefore better work.

Mr. Cadin stated that contractors frequently fail to analyze their machines properly or to recognize that all metals have a definite life span—with the result that too much is demanded of equipment and failure occurs. Some of Mr. Cadin's precepts for equipment care are: follow the manufacturer's manual for the use and care of the machine (and he urged that manufacturers improve those manuals and make them more detailed); respect the rated capacity of a machine and don't try to rig it up to do more than it is designed to do; make a competent master mechanic responsible for equipment inspection and parts replacement; keep a written record of each inspection, signed by the man who does it; don't ask your mechanics to work under adverse conditions—give them the proper facilities and the tools to work with.

Accidents on Trial

The panel discussion which featured the second session was devoted to an analysis of three accidents as each one would be viewed by a contractor's superintendent, a safety engineer, and an insurance-company claims man. Those taking part were George D. McCeney, Area Engineer, National Surety Corp., Richmond, Va., who described the accidents; Charles G. Davis, General Superintendent, E. B. Badger & Sons Co., Boston; Frank J. Crandell, substituting for J. A. Sweeney, Safety Engineer, H. K. Ferguson Co., Upton, L. I., N. Y.; and

Joel Bloomquist, Claims Lawyer, Employers Mutual Liability Insurance Co., Milwaukee.

One was a material-hoist accident. The second was an accident on a highway bridge job, involving contractor's workmen and a car using the highway. The third was damage to a building during installation of heavy equipment.

Discussion of each of these accidents from the three different points of view underscored the importance of a careful analysis of every job set-up before work begins, to eliminate, insofar as possible, conditions which create accidents; and the necessity of continual vigilance to correct unsafe conditions which may develop as work proceeds.

Do People Resist Safety?

No, said Art Matthias, final speaker at the meeting. They resist the techniques and methods by which we try to promote safety. Mr. Matthias, who is Safety Coordinator for the Wisconsin Schools of Vocational and Adult Education, and a practical psychologist,



Otto S. Holmskog (left) receives the bricklayer's hammer which is the badge of office of the General Chairman, Construction Section, National Safety Council, from Frank J. Crandell, who served in that capacity last year.

pointed out that self-preservation is a primary instinct. People don't consciously want to get hurt or killed.

There are three factors in safety, he said: engineering (including the plans and equipment of a safety program), which is important but not the com-

plete answer; enforcement, which has been emphasized too much and results in resistance to safety; and education, which is the real necessity and is still a problem because people must be conditioned to consider their own safety and that of their fellow workers.

We all enter a profession or industry with certain habit patterns which are the result of our biological heritage, our home training, our education, our associates, our recreational activities, and the kind of country in which we live. These habit patterns are a distinct challenge, because developing the individual into an efficient and safe worker means conditioning these instincts, emotions, and habit patterns so that he does the job the way the employer wants it done. And this conditioning requires the cooperation of the individual. But Mr. Matthias takes an optimistic view of the problem. He believes that human capacity for working safely has not been properly developed; that great potentialities are there, if we

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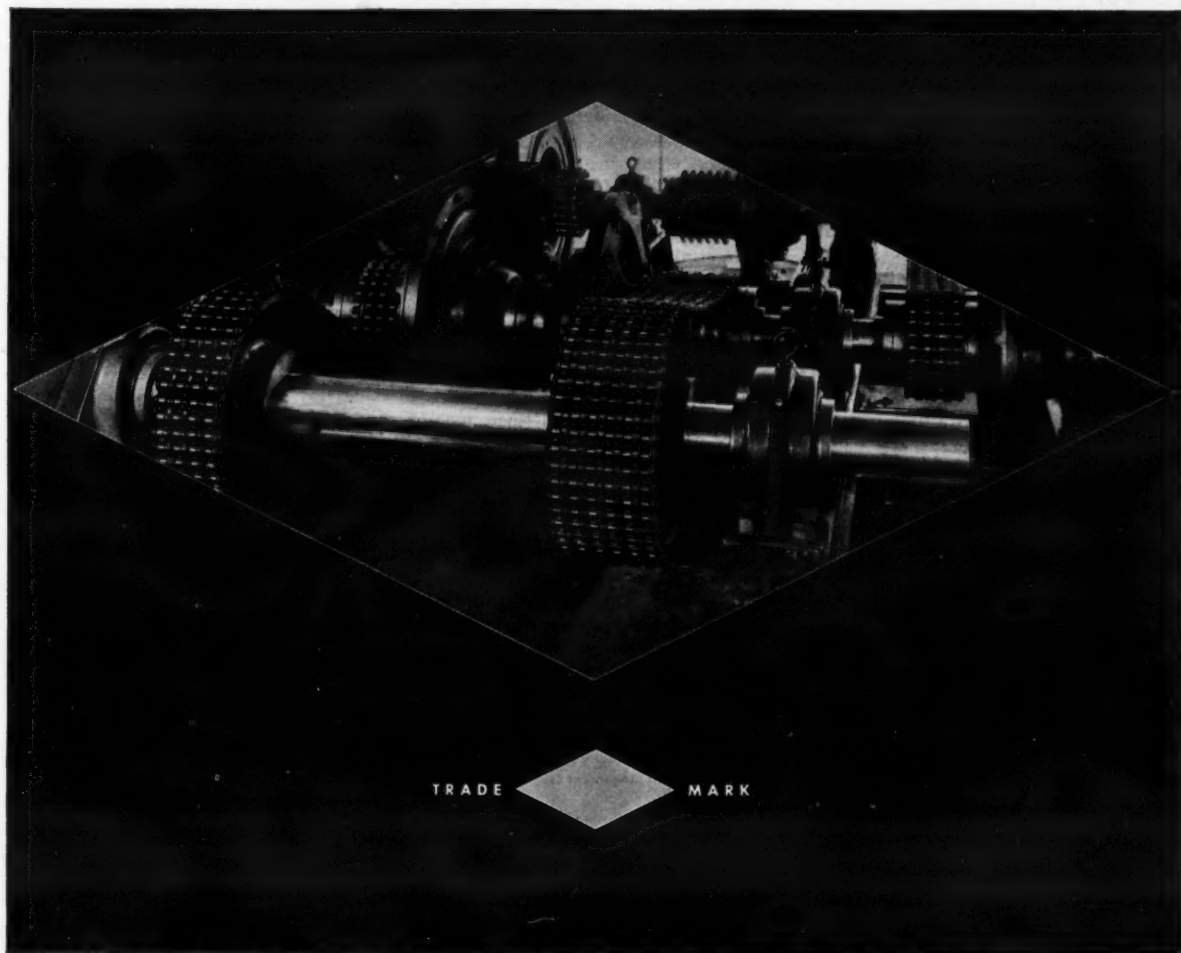


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Construction Safety Discussed at Meeting

(Continued from preceding page)

learn how to make the most of them.

New Officers

Officers of the Construction Section of the National Safety Council for the coming year are: General Chairman, Otto S. Holmskog, Employers Mutual Liability Insurance Co.; Vice General Chairman, J. A. DeLuca, Division Superintendent, E. I. du Pont de Nemours & Co.; Secretary, Olive E. Potter, Managing Editor, CONTRACTORS AND ENGINEERS MONTHLY; Chairman, Publicity Committee, Walter J. Byrne, Consulting Engineer; Chairman, Program Committee, Harry J. Kirk, Associated General Contractors; Chairman, Engineering Committee, Samuel R. Bishop, Architect; and Chairman, Membership Committee, Harold E. Sneed, DeWalt, Inc.

Other members of the Executive Committee include: (Membership) C. M. Cahill, Massman Construction Co.; Lee Deardorf, W. L. Johnson Construction Co.; Ray Hahn, Allegheny Asphalt & Paving Co.; R. J. Hendershott, Associated General Contractors of Minnesota; (Engineering) R. A. Beckwith, Koehring Co.; Virgil E. Gunlock, Commissioner of Subways and Superhighways, Chicago; Robert Halbert, Liberty Mutual Insurance Co.; W. A. Hanna, J. A. Utley Co.; Robert L. Jenkins, Chief, Safety Division, Office of the Chief of Engineers; O. Lupinski, Lupinski, Inc.; (Program) George A. Benish, Milwaukee Chapter, AGC; C. H. Black, Stone & Webster Engineering Corp.; E. A. Blanpied, Kansas City Bridge Co.; George Combs, Detroit Chapter, AGC; N. B. O'Connell, Turner Construction Co.; H. A. Radzikowski, Public Roads Administration; (Publicity) Harold M. McKeever, Roads and Streets; H. W. Richardson, Construction Methods; Vincent B. Smith, Engineering News-Record; William W. Woodruff, The Constructor; (Advisory) Frank J. Crandell, Liberty Mutual Insurance Co.; Edgar N. Goldstine, Consulting Safety Engineer; Gerard O. Griffin, Dravo Corp.; Ray J. Reigeluth, New Haven Trap Rock Co.

Committee representatives of engineering societies and national associations include: O. F. Goetz, American Association of State Highway Officials; Samuel R. Bishop, American Institute of Architects; Alfred T. Glassett, American Society of Civil Engineers; and E. H. Lichtenberg, Power Crane and Shovel Association, and Mixer Manufacturers Bureau of Associated General Contractors of America. Robert L. Moore is Senior Engineer of the Construction Section for the National Safety Council.

Tinius Olsen Co. Moves

The Tinius Olsen Testing Machine Co. has moved its offices and plant to Willow Grove, Pa. Located on Easton Road, the new plant has over 100,000 square feet of floor area.



Acme Photo

With the help of this Tournamixer and prefabricated steel forms, Contractor Clarence T. Wilson is pouring 3 concrete foundations a day for small homes in a St. Louis County, Mo., subdivision.

Production Methods Applied to Building

Poured concrete foundations for small homes are being turned out with the speed and efficiency of a production line on a housing project in St. Louis County in Missouri. The process involves the use of prefabricated steel forms and a 7-cubic-yard Tournamixer built by the R. G. LeTourneau Co. The mass-production technique was conceived by Clarence T. Wilson, a St. Louis contractor, whose specialty is airport and levee construction. He is doing the work in conjunction with the Ball Lumber & Supply Co. The entire project calls for the construction of 400 homes in the subdivision.

Moveable steel forms were built at a cost of about \$36,000 each. Four sets composed of four sections—one for each wall—are used, and each form weighs about 15 tons. After a basement is excavated and footings are laid, the form sections are set in place by a mobile

crane and bolted together at the corners. Insides of the forms are coated with oil.

The Tournamixer pours 6 cubic yards of concrete at a time and fills a form in four pours. The concrete is allowed to set for 24 hours before the forms are stripped and moved to a new location.

The job is laid out so that a 10-man crew completes three foundations every day. While concrete is poured at one site, forms are being made ready at another, footings are being laid at other locations, and basements are being excavated at still others.

Actual cost figures on the job were not available at the time this item was prepared. But Mr. Wilson feels that whether this method will save money or not, its wide adoption on large-scale production of standard-size units might help to alleviate the housing shortage.

Regular purchase of U. S. Savings Bonds means personal security as well as a share in the national security.

Bottom, Rear-Dump Trucks

Three descriptive bulletins have been made available by The Euclid Road Machinery Co., 1361 Chardon Road, Cleveland 17, Ohio. Bulletin No. 115 describes the 15-ton rear-dump Model FD Euclid with a spring-mounted drive axle and 10-speed transmission; Bulletin No. 116 describes the 15-ton rear-dump Model FD with the 10-speed transmission; and Bulletin No. 203 describes the 13-cubic-yard bottom-dump Model FDT Euclid.

Each of these one-page bulletins contains a description and condensed specifications for these earth-moving units. The bulletins illustrate each model to indicate its size and method of operation. Specifications cover capacities, power units, transmissions, brakes, springs, hydraulic equipment, dimensions, weights, and other pertinent information.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 56.

RUD-O-MATIC TAGLINE

Provides positive, steady tension — holds buckets steady under all working conditions.



Spring tension holds buckets steady. No weights, pins, tracks, or carriages. Cable saving more than pays for RUD-o-MATIC. Compact—easily installed. Eight models to fit all bucket sizes.

RUD-o-MATIC Taglines are used as standard equipment by most crane manufacturers. Spring tension is powerful enough to hold a clam shell bucket steady. Operates with boom at any angle. Compact—it can be installed in less than thirty minutes. No pins, weights, tracks, or carriages to wear or be replaced. Taglines are complete with fairlead U bolt clamping plates, and cable attached. Immediate delivery—see your equipment dealer—or write—

* Dealers—selected territories in Midwest and Northwest are still open. Write for all details.

RUD-o-MATIC combination Magnet Reel and Tagline... operates on spring tension principle with tagline attached to magnet to steady—and electric cable fastened to magnet connections with all slack needed to prevent cable from being pulled or jerked loose from connections. Exclusive with RUD-o-MATIC.



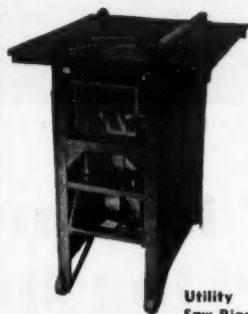
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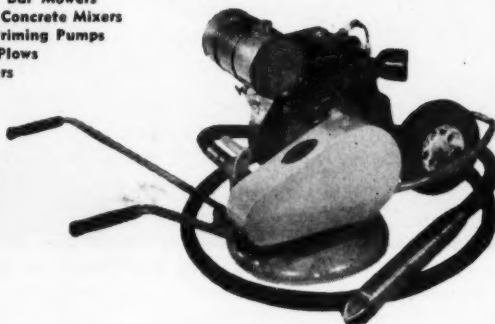
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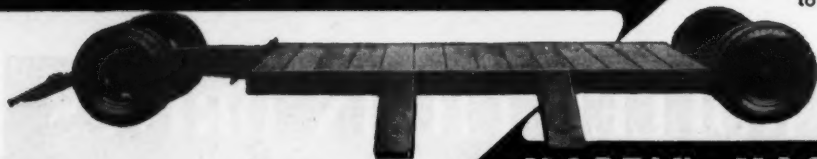
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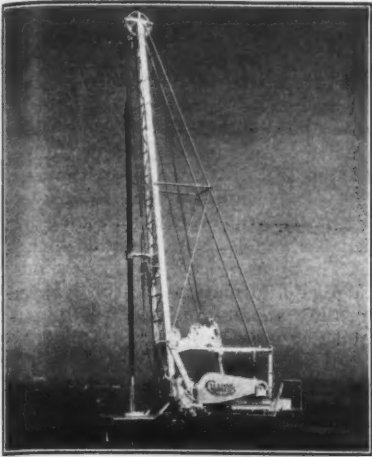


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Your "CATERPILLAR" Dealer is your MARTIN Dealer. See him for your trailer needs.



This new Cyclone blast-hole drill is designed to move into location under its own power, to set up easily, and to carry its own drilling tools.

Track-Mounted Drill Is Self-Propelled

A new blast-hole drill is announced by The Sanderson Cyclone Drill Co. of Orrville, Ohio. It can be used for drilling holes from 5 to 7 inches in diameter, and is of the churn-drill type. It is especially recommended by the company for use with portable crusher equipment when contractors are obtaining aggregates as near to the job as possible.

The Sanderson Model 1000 drill is crawler-mounted and will travel under its own power at speeds of from 1 to 4 mph. It is powered by a 35-hp Continental Model PF-226 gasoline engine. It can also be equipped with diesel or electric power units. The transmission provides three speeds forward and one reverse. The reverse gear is said to allow the driller to reverse any part of the drill mechanism independently as necessary.

The power derrick hoist is designed to permit quick setting up, and drill tools can be carried on the drill during moving operations. Four permanently mounted jacks are used for small leveling adjustments after the rig is in place. An air-spudder shock-absorbing device relieves the drilling mechanism of shock and strain and adds snap to the tool; this results in greater drilling speed, the manufacturer points out.

The new drill has a 5 x 7-foot working platform, an adjustable opening, and a 4-foot starting pipe. It is capable of handling 2,000 pounds of tools, and an adjustable stem guide in the derrick keeps the tools from working back and forth. The Model 1000 has 12-inch wide tracks, is 10 feet 6 inches long, and has a total weight of 17,400 pounds.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 73.

Scales for Many Purposes Listed in New Bulletins

A series of six new technical bulletins has been prepared by the Philadelphia Division of the Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia 24, Pa. It includes Bulletin P-714G on counting scales; Bulletins P-714D and P-714F on portable platform and bench scales; Bulletin P-714C on dormant platform scales; and Bulletin P-714K on crane scales with capacities of up to 25 tons. Also available is a bulletin devoted to the new Magnetrol scale mechanism.

The bulletin on the counting scales is complete with tabular information and a discussion of proper ratio specifications for determining quantities of weighed materials according to their weight. It discusses various methods of counting, and also lists the platform styles and sizes available, dial capacities, and other data. The bulletins on the portable platform scales and bench scales feature photographs showing the various uses of these scales.

The bulletin on the dormant platform scales stresses the new outboard bearing principle and other special design features. It gives complete data on dimensions, capacities, and shipping weights for 242 different models in six classifications. The bulletin on crane scales discusses the various models, shows the shop data on U-bolt suspensions and load hooks, and lists complete dimensions and capacities. Safety devices incorporated in the Yale crane scales are explained in detail. Specifications are listed in tabular form.

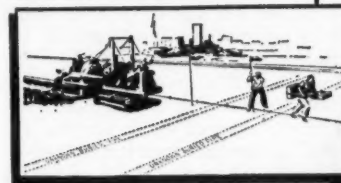
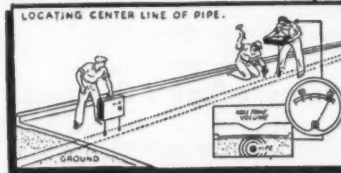
The bulletin on the Magnetrol mechanism covers its individual parts and the way they are combined. These parts include the knife-blade pointer, draft bands, rack and pinion, balance-arm shafts, locking device, and others. There is a close-up illustration of each, accompanied by a text description of its advantages and purposes.

Copies of these bulletins may be obtained from the company. Or use the enclosed Request Card. For the bulletin on the counting scales, circle No.

115; for the bulletins on the portable platform scales, circle No. 116; for the bulletin on the dormant platform scales, circle No. 117; for the bulletin on the crane scales, circle No. 118; and for the bulletin on the Magnetrol mechanism, circle No. 119.

Sales Manager for Lull

Roy H. Smallwood has been appointed Sales Manager for the Lull Mfg. Co. The Lull line includes materials-handling, construction, and maintenance equipment.

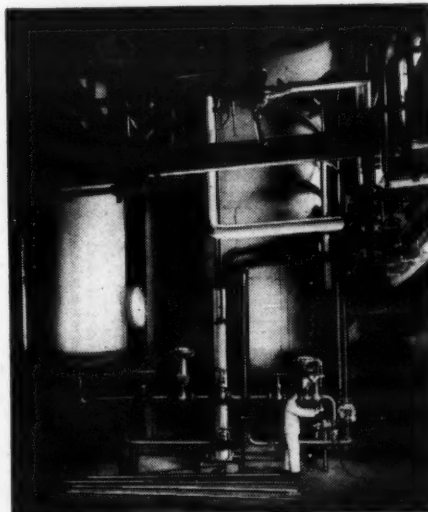


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An actual photograph of one of a battery of 12,000-gallon fermentation tanks used in a modern Penicillin production plant. Many types of GMC trucks perform many different types of transport jobs for this concern.

PORTABLE "Pipeline" FOR PENICILLIN

A few years ago, Penicillin, the newest of "wonder" drugs, was produced in small quantities by slow laboratory methods. Today, it is being manufactured on a mass production basis in large capacity plants employing the latest scientific equipment.

The GMC truck with large twin-tank trailer, shown below, "pipes" penicillin broth . . . 3,400 gallons per load . . . between plants of a leading pharmaceutical manufacturer.

Here is a graphic example of how modern mass production schedules are geared to the speed, flexibility and dependability of motor truck transportation. And, no matter what the transport need in the construction field . . . just name your job . . . there's a GMC to do it!

GMC TRUCK & COACH DIVISION • GENERAL MOTORS CORPORATION





Truck tires can be fitted with these crawler-type tracks to permit effective hauling in spite of winter snow and wind. Mounting them takes about 10 minutes, says P & G Supply Co., which handles the conversion units.

Conversion Tracks For Wheeled Trucks

Tracks designed to convert rubber-tired trucks to crawler units are available from the P & G Supply Co., 615 S.E. Market St., Portland 14, Ore. They are said to permit effective operations in mud, snow-packed terrain, deep sand, and on other surfaces which tend to bog down wheeled vehicles.

The crawler pads are made of a drop-forged steel alloy. Fitting is accomplished by adding or removing pads and linkage as required. A master adjustment on each pad assures proper track tension, says P & G. Pads are connected by a cadmium-plated chain made from a heat-treated high-tensile steel.

The Truck Tracks may be fitted to single or tandem-axle trucks equipped with most standard-size dual tires. And, according to P & G, they can be mounted or removed in a matter of 10 minutes or less.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 41.

Pile-Driving Information

Piles and caissons for foundations of every kind are the subject of a 12-page catalog issued by the Western Foundation Corp., 2 Park Ave., New York 16, N. Y., and 308 W. Washington St., Chicago 6, Ill. Described in the catalog are button-bottom piles, pedestal piles, projectile piles, pipe piles, H-beam piles, wood composite piles, compressed concrete piles, caisson piles, and driven-core composite piles.

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The City of Compton, California, realizes the economy of using the MIGHTY MIDGET. Illustrated is the MIDGET breaking a 36" width of 7" concrete for a 14 mile water main. The MIDGET is driven by a 105 CFM compressor.

Find out what the MIDGET can do for you . . . ask your nearest dealer or write:

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The catalog describes these in detail and lists the features and advantages claimed for each. Drawings illustrate how the piles are driven, and show them at various stages in the driving process. The catalog also contains a description of the sub-surface engineering service provided by the Giles Drilling Corp., an affiliate of Western Foundation Corp.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 24.

Terracer Rights Granted

Preco, Inc., of Los Angeles, Calif., has entered into an agreement with the Caterpillar Tractor Co. for the manufacture of the No. 1 and No. 2 terracers. Preco was formerly known as the Pacific Railway Equipment Co.

Caterpillar will continue to supply replacement parts for the terracers formerly manufactured by it; for the Pacific No. 1 terracer built by Dawson Mfg. Corp.; and for the No. 1 and No. 2 terracers to be manufactured by Preco.



The 15-ton-capacity Shorty jack is 7 inches high and weighs 22 pounds. It is a ball-bearing screw-type jack and utilizes a bolt-thrust bearing.

Jack Lifts 15 Tons

A 15-ton-capacity jack measuring 7 inches in height is announced by the Duff-Norton Mfg. Co., 2709 Preble Ave., Pittsburgh 30, Pa. Known as the Shorty, it is recommended by the company for

repairing cranes, for low-set loads, and for other construction needs in its size and capacity range.

The Shorty is a ball-bearing screw-type jack, and utilizes a ball-thrust bearing. The housing is of one-piece malleable iron and features machined, cut, and heat-treated gears. The ram is made of seamless tubing fitted with a high-strength bronze nut, and the pinch bar and lever is 1 1/8 x 36 inches long. The Shorty jack weighs 22 pounds.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 12.

Clearprint Opens Offices

The Clearprint Paper Co. of San Francisco has announced the opening of offices in New York City and Chicago. The New York office is at 505 Fifth Ave., the Chicago office at 20 E. Jackson Blvd. Clearprint manufactures a tracing material designed to combine the advantages of cloth with the economy of paper.



CP Sinker Drill in operation at Benson Mines, Star Lake, N. Y. Photograph through courtesy of Jones & Laughlin Steel Corporation.

There's a CP Sinker built for the job

For any type of sinker drilling, you'll find exactly the right equipment in the complete CP line of Sinker Drills, ranging from the light CP-22 to the heavy duty CP-60N.

For production work in soft to medium formations . . . block holing . . . lateral and overhead trimming . . . operating in restricted quarters — the CP-22 (30-pound class) is ideal. Perfectly balanced, it is easily operated by one man.

For shaft sinking . . . underhand stoping . . . general utility work in medium to hard formations — the CP-32 (45-pound class) is recommended. Its low air consumption adapts it for use with portable compressors.

Designed for shaft sinking in the harder formations . . . other heavy duty work — the CP-42 (55-pound class) has a longer stroke, although otherwise identical in design with the CP-32. Its powerful air blow keeps even the deeper holes free from cuttings. It can also be used on a board for horizontal drilling.

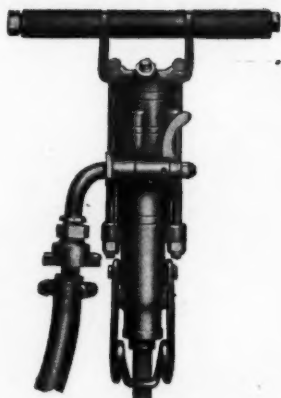
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CP-22 Sinker Drill



CP-42 Sinker Drill



C. & E. M. Photos

The Chevrolet dump truck at left spreads a load of mine-run chat at the Joplin Airport in Missouri. The airport administration building and control tower are in the background. Above, a Wood Roadmixer mixes chat, cement, and water to form the base of Taxiway II.

Joplin Chat, Cement Used for Airport Base

(Continued from page 1)

lized base.

For some time now, commercial airlines have insisted on the construction of a new northwest-southeast runway, with a better system of taxiways. They have also made recommendations that the existing north-south and northeast-southwest runways be lengthened slightly, but to date this work has not been done.

The recent contract constructed a new runway 4,600 feet long and 100 feet wide. Taxiway work made the new and old runways accessible for take-off without the necessity for planes to taxi on the main runways.

Foundation and Design

The Joplin airport covers a plateau of land on high ground. Rock, hardpan, and stiff clay underlie it. Almost all the rain water falling on the big field runs off without soaking in to any appreciable extent. Thus the subgrade was generally good. Grading plans called for all fills and the first 6 inches in cut sections to be compacted to 95 per cent of modified Proctor density. The fills were brought up with rollers; cut sections had to be scarified and then rolled after that.

The aggregate situation peculiar to this vicinity was the determining factor in designing the pavement at the airport. Millions of tons of mine-run chat are piled over a large area there and are available for use at little or no cost at the pile.

For runway and taxiway construction, a 4-inch layer of compacted-gravel sub-base was laid first, on the earth subgrade. This was followed by a 6-inch blanket of cement-stabilized chat base which was sealed with asphalt. A 1½-inch hot-mix asphaltic-concrete top completed the construction, with 2 inches of this material placed where planes have to stand to warm up. The new runway was built with a 5-inch crown, while the 50-foot taxiways have only 3-inch crowns.

A small plane parking area, also built under this contract, has 4 inches of soil-bound chat base with a single asphaltic penetration seal coat. The portland-cement concrete parking apron also rests on a 4-inch compacted chat sub-base.

The cement-stabilized base, however, was the biggest and most important item of the project.



Jobs Done Quicker, Cheaper

Attached to Tractors, Bulldozers, Motor Graders and Scrapers, the Automatic Slope-Meters are in use on the construction of highways, airports, dams and building sites. Slope-Meters are compact, sturdily constructed instruments that will automatically show the operator the exact grade or slope on which he is working.

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Earth Work and Grading

Earth work covered a big area for the amount of yardage involved. Some of the cuts were only 9 to 10 inches deep, and were a city block wide by two city blocks long. Most of this borrow area was covered by light grass which was mostly dead and dry when the job

started.

Three International TD-18 tractors with Bucyrus-Erie 10-cubic-yard scrapers moved the dirt. The grass was set afire and burned, but Tri-State was required to strip the top of the ground also, to eliminate the grass roots.

The material was then excavated and carried to fill locations, where it was dumped in lifts 6 inches thick or less. Water was added by two 1,000-gallon sprinkler trucks, and the earth was

tamped down tight by sheepfoot rollers. A 2 and 3-unit sheepfoot roller was used, pulled by a TD-14 International tractor.

Density tests were carefully made as the earth work progressed, and any fills not testing 95 per cent were ripped up and re-processed. On the day the project was visited, an area which tested 93.7 per cent was being ripped and re-processed. All areas were built to the

(Continued on next page)

NOTE ALL THESE FEATURES

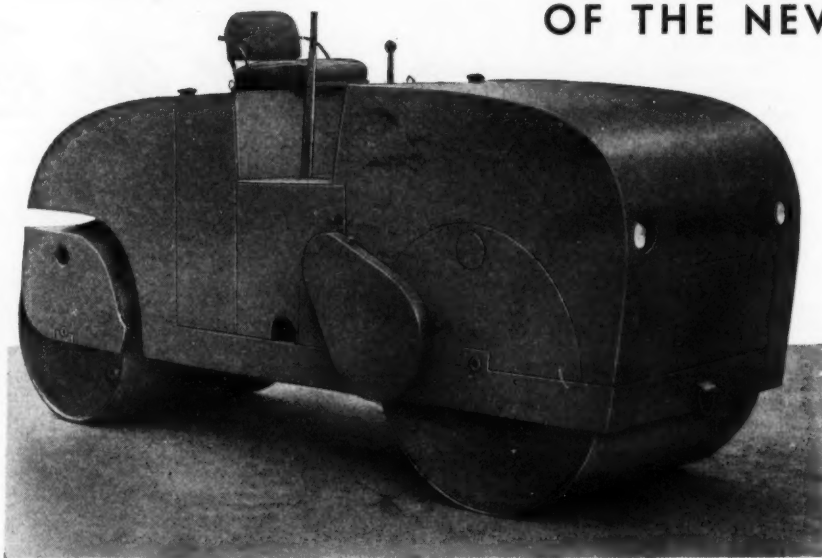
OF THE NEW



TANDEM ROLLERS

3 VARIABLE
WEIGHT SIZES:
3 to 5—5 to 8
—7 to 10 TON

All with SINGLE LEVER
HYDRAULIC STEERING—
CONVENIENT ELECTRIC
STARTER AND OTHER TOP
MECHANICAL FEATURES



Right side view of the new SEALCOAT TANDEM ROLLER. The seat location allows the operator to see the work in all directions. This, with the conveniently located right-hand clutch lever and the left-hand ball top hydraulic steering lever, permits of easy handling whether working in the open or in corners and confined spaces.

THIS INFORMATION COVERS THE 3 TO 5 TON ROLLER

MAJOR SPECIFICATIONS

POWER—Heavy Duty Industrial Engine—125 cu. in. piston displacement. 24.5 Brake Horsepower @ 1500 RPM; 27.8 Brake Horsepower @ 1800 RPM. Speeds: 2 forward and 2 reverse give 1.55 to 4 MPH range in either direction.
DIMENSIONS: Wheel Base 91". Length overall—132". Width overall—43". Tank height—57". Ground clearance—13½". Left side clearance—1½". Right side clearance—3½".
ROLLERS: COMPACTION—Width—38". Diameter—40". Rolled and machined from ¾" stock.
STEERING—Width—38". Diameter—30". Rolled and machined from ¾" stock.
COMPRESSION—Per lineal inch: Compaction Roller—155 lbs. with ballast. Steering roller—75 lbs. with ballast.
WEIGHTS: Shipping weight (approximately) 6500 lbs. Maximum weight (with ballast) 10,000 lbs. Extra metal weight—600 lbs.

WHEELER TANDEM ROLLER 3 TO 4-TON VARIABLE WEIGHT

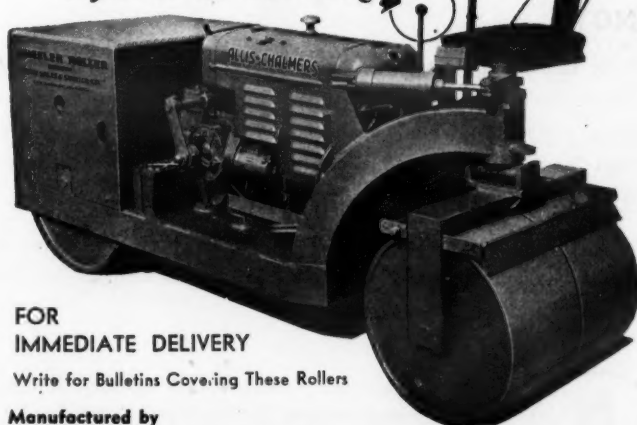
This is essentially the same in its sturdy construction and major operating features as the SEALCOAT Roller (above). Power specifications are identical. It is basically different in design and other minor specification differences given below.

MAJOR SPECIFICATIONS

DIMENSIONS: Wheel Base 7'10"; length overall 10'7"; width overall 3'4". Tank height 4'10". Ground clearance 10". Left side clearance 1½".
WEIGHTS: Shipping weight (approximately) 5500 lbs. Maximum Weight (with ballast) 8000 lbs. Extra metal weight 400 lbs.
COMPRESSION: Per Lineal Inch: Compaction roller, 150 lbs. with ballast. Steering roller, 70 lbs. with ballast.
ROLLERS: COMPACTION—Width—36". Diameter—37". Rolled from ¾" stock.
STEERING—Width—34". Diameter—27". Rolled from ¾" stock.
TIMKEN BEARING EQUIPPED THROUGHOUT

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Joplin Chat, Cement Used for Airport Base

(Continued from preceding page)

specified densities before the first courses of gravel sub-base were permitted.

Gravel Hauled and Laid

The first course of compacted-gravel sub-base was next in order after grading had been finished. This material was also a mine-run chat from the lead and zinc mines near Joplin, but the mix did not have as many fines as did the base chat.

It was laid out by end-dumping, spread by a Caterpillar No. 12 and a Galion motor grader, wet by sprinkler trucks, and rolled. Density tests were also taken on this material to insure the 95 per cent result.

Chat Comes in to Airport

With the sub-base laid and bladed true to surveyors' blue-tops, the next step in the job concerned the mine-run chat for the base. Specifications called for a mine-run material meeting the following tolerances as to sieve sizes:

Passing No. 4	50-80 per cent
Passing No. 10	35-60 per cent
Passing No. 100	5-15 per cent

The specification gradation was purposely left rather lax in order to allow the use of any of the waste piles available, and thus prevent unnecessary high costs due to narrow limits. The engineers knew, however, that the material would be better than required by the gradation shown, because all of the piles of chat within the wide limits allowed were known to be well graded and capable of compaction into a dense surface even without the use of additives.

The material came from a lead and zinc mine at Oronogo, about 5 miles from the airport, on property owned and operated by the Tri-State organization. It was loaded at the mine by a General ½-cubic-yard shovel, and hauled to the job by 6 Ford and Chevrolet dump trucks. Hauling was done ordinarily on the basis of an 8-hour daylight shift.

The material was end-dumped in the approximate amount required for a 6-inch compacted lift. By spreading the material 6¼ inches thick, allowance could be made automatically and accurately for the settlement to take place later under the action of rollers. When

A Caterpillar No. 12 motor grader, left, levels mixed base material on the Joplin Airport job, just ahead of the sheepsfoot roller. At the end of the day's run, Tri-State workmen, above, shovel the stabilized material square to install 6 x 6 header timbers.

the material had been placed, it was very carefully bladed and checked. Survey stakes every 50 feet, and 25 feet apart starting at the pavement edge, were used to check the chat elevation.

Specifications required the use of forms on the cement-stabilization work, so approximately 3,800 linear feet of native oak forms were purchased and brought in. These forms consisted of a

2 x 6-inch upright spiked to a 2 x 4 oak base set at right angles to the base of the form. Steel pins were driven through the form base to hold the 10-foot form sections true to line. Form lines were also checked with a transit.

Forms were set on a bench prepared by a pass of the motor grader, and dressed lightly by hand. In order to get

(Continued on next page)

Standard Equipment on the Tough Jobs

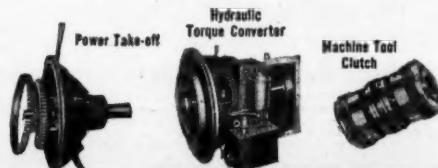


A Schramm 315 diesel engine driven type of portable air compressor supplies air for operating the rotary drills on a road building job at an altitude of 6,000 to 8,000 feet. Twin Disc Model SLT Clutches are used on all Schramm 315 Compressors.

Twin Disc Model SLT Clutch.

Standard equipment on almost every make of air compressor today is the Twin Disc Spring Loaded Clutch. In this tough, continuous service, the SLT needs no coddling . . . it's a clutch that you can almost forget about.

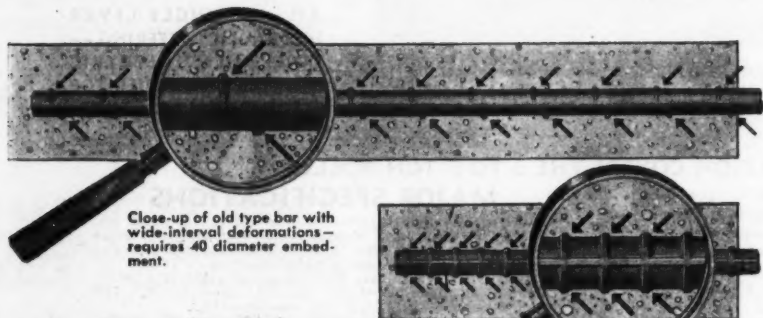
Twin Disc Spring Loaded Clutches are constructed in one, two and three plate models having a total square inch friction area of from 90.7 to 475.5. Outside diameters range from 10 to 14 inches, with working torques ranging from 100 to 630 ft. lbs. for compressor service. For additional information, write to the TWIN DISC CLUTCH COMPANY, Racine, Wis., (Hydraulic Division, Rockford, Ill.).



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Close-up of old type bar with wide-interval deformations—requires 40 diameter embedment.

Close-up of Laclede Multi-Rib bar (in conformance to new ASTM specification A 305-47 T), showing same anchorage within 20 diameter length.

LACLEDE MULTI-RIB REINFORCED BARS REQUIRE LESS THAN HALF THE EMBEDDED LENGTH...

When the strength is there (in excess of 55,000 psi) as in the case of Laclede Multi-Ribbed Reinforcing Bars, why waste steel and add to cost and tonnage by specifying unnecessary bar embedment through codes rapidly becoming obsolete? By demanding reinforcing steel conforming to ASTM Specification A 305-47 T you can benefit from a more efficient use of steel.

The balanced design of the Laclede Multi-Rib Reinforcing Bar combines improved anchorage with high yield strength steel to assure its efficient use in up-to-date, economical construction.



Your specifications should include the ASTM A305-47T requirement for reinforcing steel.

LACLEDE STEEL COMPANY

St. Louis, Mo.

a firm bearing for the forms, it was necessary for Tri-State to waste some sub-base material outside the neat lines. Bad weather in the fall and spring forced this work to go in only as permitted by grading operations. No special lengths of runway or taxiway were set up. The longest section at the time the job was visited late in May had been 530 feet on the new runway.

Cement Stabilization Work

Lehigh portland cement was used, in bag shipments, from the Lehigh plant at Iola, Kans. The stabilization mix called for 12 per cent of cement by volume, which figured out to be 0.54 sack per square yard. Optimum moisture content, from the material curves, was calculated at 9½ per cent. The optimum dry-weight maximum laboratory density was 135.3 pounds per cubic foot; maximum wet density was 148.5 pounds per cubic foot.

The bag cement came in to the railroad siding at the Oronogo mine and was handled from there to the job by 4 Ford and White cement trucks. One truck was used as an extra, with three trucks and their crews spreading the cement.

A rather unusual system was used to spread the cement accurately. It was spaced in the center of ten longitudinal lanes on runway work and five longitudinal 10-foot lanes on taxiway work. To mark this line, and also to serve as a distance marker, special 200-foot chains were made up with metal washers wired on at intervals of 40 inches. This chain was stretched out ahead of the trucks, on the proper line.

Each truck used a special hopper with a canvas boot to train the cement to the base without flying. This hopper was so arranged that it could be easily mounted on the side of the truck, with the bottom of its trunk just even with the ground.

On each crew—and there were three—one man cut the bags open, two men dumped them, one man spotted the truck, and two men handled the chain. A bag of cement was dumped exactly over each washer on the chain, and one bag was dumped between each washer, since cement requirements were one bag every 20 inches of 10-foot lane.

The cement crews usually started their work about 1½ hours ahead of road-mixing operations to give them a head start. In that short period of time, the cement would not blow away or hydrate.

At first, the lanes were windrowed ahead of the big Wood Roadmixer. It was found in a short time that this was not necessary, because the Wood machine would pick up the material easily as it moved along behind an Allis-Chalmers HD-14 tractor. In some sections where the chat had lain long enough to settle or get tight, a pass of a Seaman Pulvi-Mixer loosened the lift sufficiently to improve the Roadmixer's performance.

Traveling at a rate of from 15 to 18 feet per minute, the Model 54 Wood Roadmixer then passed through each

lane. A supply of mixing water had previously been developed on the airport, consisting of a 3,600-gallon stand tank and a 3-inch centrifugal pump in a near-by pond. As water was pumped up to the stand tank, a war-surplus 4,000-gallon gasoline tanker carried the water to the mixer.

The water tank was attached to the Wood Roadmixer by a length of flexible hose, and the Roadmixer pump put whatever moisture was needed in the mix. In a single pass this machine mixed cement, chat, and water, and left behind it a windrow of well blended material.

Road-mixing usually got under way about 6 a.m. and finished about 3 in the afternoon. This gave enough daylight before and after to spread cement and finish the rolling.

As the Roadmixer finished each lane, the material was spread out to grade by the motor graders. As each lane was leveled, sheepfoot rolling commenced. Sheepfoot-roller work was started by making about six passes next to the forms. Then as each pass was com-



C. & E. M. Photo

W. B. Kane, left, was Field Engineer for Tri-State Construction Co. out at Joplin Airport, and G. J. Fenix, one of the contracting partners, gave the job his personal supervision.

pleted, the tractor moved over the width of its track pads, automatically giving

each lane from six to eight passes. This rolling compacted the material in the lower 4 inches to densities of from 95 to 101 per cent, and caused the roller feet to walk out almost to the surface.

Where motor-grader tracks were noticeable ahead of the sheepfoot roller, the Pulvi-Mixer was used to eliminate them.

When sheepfoot rolling had been finished, 6 x 6 timber headers were installed square with the ends of the day's work. The soil-cement was cut back with a motor-grader blade and hand shovels to a string line set at right angles to the runway. The header timbers were staked down with steel pins.

A motor grader then made one pass over the material to level off any rough places left behind the sheepfoot. And a truck-drawn Bros Wobble Wheel pneumatic roller made a single pass, carrying the rolling to the top of the headers.

Surveyors then moved in quickly and set blue-tops every 50 feet of length, (Concluded on next page)

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Joplin Chat, Cement Used for Airport Base

(Continued from preceding page)

and 25 feet apart. The material was dressed to these reference points by the Caterpillar motor grader, which swept any excess material off to the side. The volume had been so carefully calculated, however, that waste was negligible.

A smooth 10-ton Galion tandem roller was then used on top of the stabilized chat to put on surface compaction and to iron out all tire marks. The material was left smooth, dense, and shipshape in appearance. Ordinarily it was about 4 hours after road-mixing had stopped for the day before the rollers finished their work.

The stabilized base was cured the day after it was laid by applying an average of 0.35 gallon of MC-1 per square yard, at an application temperature of 140 degrees. A shop-made distributor, incorporating close spray-tip spacing, powerful pump capacity, and even spray pressure, was used.

The 1½ and 2-inch hot-mix topping was produced in the Tri-State commercial Barber-Greene asphalt plant set up near Joplin, hauled to the job by batch trucks, and laid in place by a Barber-Greene Tamping-Leveling Finisher. No traffic was permitted over the stabilized-base seal coat, so no brooming was necessary.

Personnel

Field work for the Tri-State Construction Co. was under the personal supervision of G. J. Fenix and Guy Waring, the contracting partners. W. B. Kane was Field Engineer for Tri-State on the project.

The job was designed and supervised by Pate Engineering Co. of Tulsa, Consulting Engineers, for whom Ray Parker was Resident Engineer. Herbert H. Howell is Superintendent of Airports for the Kansas City Office of the CAA. Field Engineers Carl Chappell and Carl Irwin of the Portland Cement Association furnished valuable technical assistance on the project.

Martin, Jr. Joins Teco

Charles F. Martin, Jr., has joined the sales and engineering staff of the Timber Engineering Co. He will be Manager of the Chicago office.

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for contractors, highway officials and distributors wanting further details on printed matter from the manufacturers advertising in these pages. Our Reader Service Department will be glad to forward any literature or special requests you mail to us at the above address.

Contractors & Engineers Monthly



The 4-wheel-drive principle has been applied to the new Model HM tractor shovel, latest in the Payloader line. The unit has a 76-hp engine and travels up to 16 mph.

Tractor-Shovel Unit Has Four-Wheel Drive

A new Payloader tractor-shovel combination is announced by The Frank

G. Hough Co., 801 F Sunnyside Ave., Libertyville, Ill. Features of the Model HM Payloader are 4-wheel drive and a power-booster steering mechanism. The unit has a 76-hp engine and will travel, under its own power, at speeds up to 16 mph. Bucket capacity is listed at 1½ cubic yards; static-loading capacity, at 6,000 pounds. The Payloader is equipped with four 14.00 x 24.00 road-builder tires.

Bucket raising and lowering, and dumping and closing, are accomplished by double-acting hydraulic rams. The bucket booms are designed to permit an automatic digging action independent of the forward motion of the tractor. Automatic tip-back of the bucket allows heaped loads to be retained without spillage while carrying. Power steering of the rear wheels and a fully-reversing transmission with four speeds in either direction increase the maneuverability of the HM. Attachments available for use with the Payloader include bulldozer, crane hook, and snow plow.

Further information may be secured

from the company, or by using the enclosed Request Card. Circle No. 28.

Records of Treated Lumber

A series of service records for treated lumber have been compiled by the American Lumber & Treating Co., 332 S. Michigan Ave., Chicago 4, Ill. Based on an extensive case-history file, it covers installations of Wolmanized treated wood going back as far as 24 years. The present edition brings an earlier one up to date and summarizes re-inspections of the original installations. It was prepared by the Technical Department of the company.

The booklet contains detailed information on the various installations, describing class of service, location, type and size of material, species of wood, average dry-salt retention, quantity of board-feet used, dates of installation and inspection, and general remarks.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 44.



YOU remember only too well how a job like this used to be handled. It meant a small mixer, small capacity, perhaps shooting towers or lots of concrete buggy work, perhaps a crane and lots of false construction.

Look at this job. A MultiFoote 34-E with the elevated boom. The elevated boom puts the concrete up over 23 ft. with the bucket doors clear. The MultiFoote travels along the forms to reach any spot on the job — no extra equipment, labor cut to the minimum, no unnecessary false work or ramp construction.

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Anti-Glare Planting On N. J. Median Strip

A type of median-strip planting to eliminate headlight glare without creating a serious winter snowdrift problem has been developed in New Jersey. First tried out on the new 8-lane section of Route 25 through Newark, it has proved so successful that last spring the planting was extended for a distance of one mile.

Instead of continuous planting along the median strip, Robert S. Green, Principal Landscape Engineer of the New Jersey State Highway Department, has planted evergreens in rows at intervals across the 12-foot center strip. These intervals were determined by a careful study of the highway alignment and of the direction of headlight glare from passing cars, so that as soon as a car has passed one planting, its headlight glare is screened by the next one. The row of evergreen shrubs is planted on a 30-degree line off the perpendicular of the median and extends from curb to curb in the direction of traffic flow. On the straight-away, the plantings are 60 feet apart; on curves, the spacing is 50 feet.

The evergreens used for the diagonal planting are *Ilex crenata*. On either side are planted lower flowering shrubs so that the effect is a bed of shrubbery at intervals, rather than a straight line of planting. The other shrubs include *Diervilla sessilifolia*, *Lonicera Morrowi*, *Rhodotypos kerrioides*, *Rosa blanca*, and *Viburnum dentatum*. For ground cover, *Ampelopsis heterophylla* is used, 3-year-old field clumps being specified.

The planting was done by contract. The specifications required that the topsoil on the median strip be turned under and used in the plant holes. Approximately one pound of plant food (dried, pulverized, or shredded cow manure with a minimum of 60 per cent organic matter) was used per plant. The *Ilex crenata* were 4½ to 5 feet in height, with a minimum root-ball diameter of 18 inches. These shrubs were furnished balled and burlapped, while the lower shrubs planted on either side, and ranging in height from 2 to 4 feet, were furnished with bare roots.

After the shrubs and ground cover were planted, a mulch of humus was spread over the entire planting area to a depth of 1½ inches. This averaged approximately a ton of humus per 500 square feet of planting area. The humus consisted of a decomposed vegetable matter containing a minimum of 80 per cent organic matter and averaging 2 cubic yards per ton.

Although center-strip planting to screen headlight glare is an essential safety measure, it may result in snowdrifts on the highway. The experimental planting of 1947 in no way hindered snow-removal operations. Nor did any of the individual plantings cause serious drifts. Snow damage was slight and plant mortality in this most unfavorable commercial area for plant survival was less than 5 per cent. New Jersey's planting design should be of help to other states with this problem.

Exhaust-Pipe Cover

A cover for use on vertical exhaust pipes is distributed by the H. M. Sheer Co., 419 Payson, Quincy, Ill. It is designed to keep rain out of the exhaust pipe and manifold, to stop rusting of valves, to prevent rain-flooded pistons, and to deflect exhaust fumes.

According to the Sheer Co., the cover will open automatically when the engine is started and—because of its counter-balanced weight—close automatically when the engine is stopped. These covers are made of die-cast aluminum in a range of sizes to fit pipes up to 3½ inches in diameter.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 47.



Foster tilt-bed trailers also serve as mobile ramps for loading and unloading.

Tilt-Bed Trailers Serve Dual Purpose

A line of tilt-bed trailers is manufactured by Foster Trailer Co., Inc., 2029 Sacramento St., Los Angeles 21, Calif. In addition to its primary use as a tilt-bed trailer, the Load-Doubler can also be used as a mobile loading ramp with a flat-bed truck. This is made

possible by the automatic cribbing brakes and an automatic hydraulic tilting device—the brakes serving to prevent movement of the trailer while loading. Load-aid hooks in the recesses on the truck bed also help in moving equipment across the trailer.

The Foster trailers are available in tandem or single-axle types, and in fourteen sizes and styles. Capacity

range of the line is from 3 to 30 tons. These capacity ratings are based on a load distribution of 40 per cent on the king pin and 60 per cent on the trailer axles.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 29.

Self-Propelled Power Saw

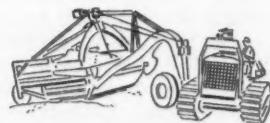
A self-propelled power saw is described in a folder distributed by the Little Giant Tree Feller Corp., P. O. Box 695, Dallas 1, Texas. Said to "mow 'em down even with the ground", the Little Giant saw is made in five models.

The folder illustrates nine uses of the saw, including felling and bucking, cutting stumps to ground level, clearing ground, bulldozing, and others. A section of it describes the attachments for use with the basic unit—a chain saw, a post-hole digger, and a power take-off.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 10.

*"Greater yardage
lower maintenance costs*

with Gulf Quality Lubricants and Fuels"



... says Florida Contractor



B. B. McCormick & Sons, Inc., Jacksonville Beach, Florida, have the contract to build about six miles of State Highway #125 in Baker County, Florida. The

project involves clearing and grubbing, grading 70,000 yards, approximately the same yardage of lime rock base, surface treatment, and a 200-foot concrete bridge.

"Our earth moving equipment is delivering top-notch performance with Gulf lubricants and fuels on the job—one big reason we're making fast time," says Joseph Dickey, Superintendent of B. B. McCormick & Sons, Inc. "Gulf products and fine service help us get more work out of each unit and avoid mechanical troubles, which means extra

yardage and lower maintenance costs."

Like so many other leading contractors, B. B. McCormick & Sons has found that it's good profit insurance to use Gulf lubricants and fuels. Gulf quality lubricants provide an extra margin of protection against mechanical delays—and Gulf quality fuels help insure more efficient engine performance.



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Shown here dumping, the Model E-16 Tournarocker has a capacity of 16.5 cubic yards or 16 tons. It is powered by a 150-hp Model C Tournapull.

New Rear-Dump Wagon Has 16-Ton Capacity

A rear-dump wagon called the Tournarocker is announced by R. G. Le-Tourneau, Inc., Peoria, Ill. It has a struck capacity of 16.5 cubic yards or 16 tons, is designed to be loaded by shovel or dragline, and is powered by a 150-hp Model C Tournapull. The unit end-dumps material behind its rear tires. Forward speeds range from 2.19 to 17.3 mph; reverse, from 2.19 to 4.38.

Dumping is accomplished by locking the brakes on the rear wheels and raising the bowl by means of a Tournatorque electric motor and cable attached to the bottom rear of the bowl. This pulls the prime mover back towards the rear wheels, tips the bowl, and dumps the material. Electric-motor cable control also allows the Model E-16 Tournarocker to dump while traveling.

Positive electric steering, plus a 90-degree $12\frac{1}{2}$ -foot turning radius, are said to make the Tournarocker highly maneuverable. It has an overall length of 26 feet 1 inch, an overall width of 10 feet $3\frac{1}{2}$ inches, and a loading height of $6\frac{1}{2}$ feet. The bowl is 7 feet $10\frac{1}{2}$ inches wide x 11 feet 2 inches long; the wheelbase is 15 feet 3 inches; and weight is 28,500 pounds. The Tournarocker is mounted on 21 x 25 tapered-bead tires. It has 4,176 square inches of braking surface in its 4-wheel multiple-disk air brakes.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 76.

New Vibrator Shaft

A new type of concrete-vibrator shaft has been developed by Wyzenbeek & Staff, Inc., 838 W. Hubbard, Chicago 22, Ill. As it is described by the company, the reinforcing spring of the flexible shaft has been locked in by imbedding it in a heavy layer of oil-resistant molded rubber. This is designed to provide a heavily-reinforced shaft which is perfectly smooth on the outside; to prevent breakage of the casing; and to present no external springs to catch on forms or reinforcing bars.

Another feature of this shaft is the use of the Wyco graphite-impregnated non-metallic innerliner. The impregnated inner lining is said to present virtually no loss of power through friction. And the core is protected at all times from contact with the inner metal tubing of the casing. The Wyco shafts have left-hand rotation, and the core end nearest the machine is threaded to permit the shaft to be used in a vertical or down position without loss of efficiency.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 102.

Twin Disc Holds Election

The election of John H. Batten as President is announced by the Board of Directors of the Twin Disc Clutch Co. P. H. Batten, founder of the company and Past President and Chairman of the Board, will continue in the latter position. Other officers who were re-elected are: Soren Sorenson, Vice President of Manufacturing; N. F. Adamson, Vice President of Sales and

Engineering; G. L. Shuman, Secretary-Treasurer; R. T. Rehwal, Assistant Secretary; and R. T. Howell, Assistant Secretary.

Engineering Law

A text called "Business, Legal, and Ethical Phases of Engineering" has been published by The McGraw-Hill Book Co., 330 W. 42nd St., New York 18, N. Y. It is designed as a text for senior engineering students and as a reference book general enough in scope to be of help to all branches of the engineering profession. It was co-authored by Professors D. T. Canfield and J. H. Bowman of Purdue University.

The book discusses simple bookkeeping, aspects of money borrowing and lending, legal aspects of contracts, ethical aspects of bids and specifications, terms and application of the patent laws, workmen's compensation laws, and ethics and conduct in the engineering profession. It is 358 pages long and sells for \$4.50.

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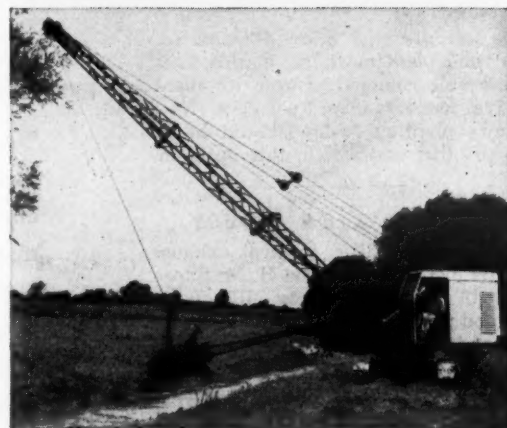
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FIFTEEN YEARS AGO this $\frac{3}{4}$ -yard General was given a "tough" assignment—in the clay pit of Linhardt Bros., Mt. Sterling, Mo. Clay rock, so hard it has to be dynamited and so slippery when wet you can't get a footing on it, is difficult to handle. Slick, heavy, rolling boulders are elusive . . . hard for an operator to pick up.

But this old General has been doing the job satisfactorily, efficiently, ever since it started. It still takes a full dipper every swing—can load a 5-yard truck with only seven passes. During its long service, Linhardt Bros. have replaced truck fleets many times, but the General keeps right on loading!

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County Uses Plant-Mix For Road-Resurfacing

First 2.8-Mile Project Has Needed No Maintenance in 10 Years; Second Project Uses a Tamping Paver

AT the Purdue Road School last February, Ronald Horton, Highway Supervisor of Jefferson County, Ind., summarized that county's experience with plant-mix bituminous materials. The experience is limited, he said, to the use of bituminous-concrete surface material (AH), meeting Indiana State Highway Specifications. And it was first used in 1937 on a WPA project to resurface old black-top roads running through the unincorporated towns in the county. Each stretch of road had a solid base and good drainage, but a badly worn surface.

As the first step in the operation, the old surface was cleaned and the holes patched. Then a light tack coat of RC-3 was applied to insure the new surface sticking to the old. The mixed material, covered with tarpaulins to keep it hot, was hauled from the plant in dump trucks and dumped as needed ahead of the spreaders. It was spread by hand with shovels and leveled with floats to an average depth of 1 1/4 inches. The thickness was controlled by the use of flat, iron bars 1 1/4 inches wide and held on edge by a 6-inch T welded to the forward end; this made it convenient to draw bars forward as the work progressed.

As soon as the material was cold enough to prevent pushing, a 10-ton roller compacted it to approximately an inch in thickness. The road was opened to traffic as soon as it had cooled and was solid enough to prevent tracking. One ton of material, one inch thick, covered 18 square yards. The mixture cost \$6.00 per ton at the plant at that time.

During 10 years' use, reported Mr. Horton, that pavement has not required any maintenance. Apparently it will not require any for a few years, and then possibly only a light seal coat. There is no indication of checking or raveling, and the wear-down of the surface is very slow. The project included roads in four small towns, and had a total length of 2.8 miles.

Though the results of the project were most satisfactory, Jefferson County officials did not feel they could afford to build pavement of this type until traffic was heavy enough to justify doing so. Also, they had to be reasonably sure that no more changes would be made in alignment, and that all base failures were corrected as nearly as possible before paving. With this in mind, they planned to build a few miles of low-cost black-top each year and correct the weak spots as they developed from heavy traffic. They hoped eventually to be able to pave a part of these roads with plant-mix material if they could get a plant into their county to save the cost of haul.

Second Project

This opportunity came in 1946 when a hot-mix plant was moved in to pave some state roads. The County let a contract for material to be laid with a tamping paver at a cost of \$7.00 per ton in place. This included all labor and equipment for sweeping the old surface, all patching, guarding traffic, rolling, and any expense connected with the project. The County had an inspector on the job at all times.

The old black-top surface was cleaned and primed with a fog coat of RC-3 asphalt the day before paving started. Dump trucks hauled and dumped the material directly into the paver. Rolling was kept up close to the paver, and the road was opened to traffic at the end of each day's work.

Unlike the first project, no attempt was made to add any certain thickness over the whole road. The paver was set so it would spread the material as thin as possible but leave a smooth surface with a slight crown. This made an average depth of about 3/4 inch, with very little on the high spots and the low spots brought up level and tamped full. It was felt that a tamping paver secured a good job with one pass over the old pavement—without so much work and expense in filling the holes and low spots ahead of the paver. However, it was important that all holes and low spots be tamped full enough so that no depressions would develop under traffic, as frequently happens to resurfaced jobs.

While this type of material may seem too expensive for county roads, said Mr. Horton, Jefferson County officials feel that plant-mix material of some kind will eventually replace the road-mix and result in a better and more lasting pavement with a saving of bituminous material.

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There's a money-saving Oakite cleaning technique for your Diesel filters. For cleaning-tank details, solution recommendations, contact your nearby Oakite Technical Service Representative. His helpful services yours without obligation.

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The tremendous power and unfailing traction of Walter 4-Point Positive Drive, clears at higher speeds, removes greater volume on each run. You clear more miles per hour, at lower cost. You need fewer units to do the job. You are equipped to handle any snow conditions, from average falls to raging blizzards—from hardpacked ice and snow, to deepest drifts.

• FEWER TIE-UPS

Your community losses due to blocked roads are reduced to a minimum with Walter Snow Fighters because your roads are opened fast and kept open throughout the storm.

• ALL-YEAR USEFULNESS

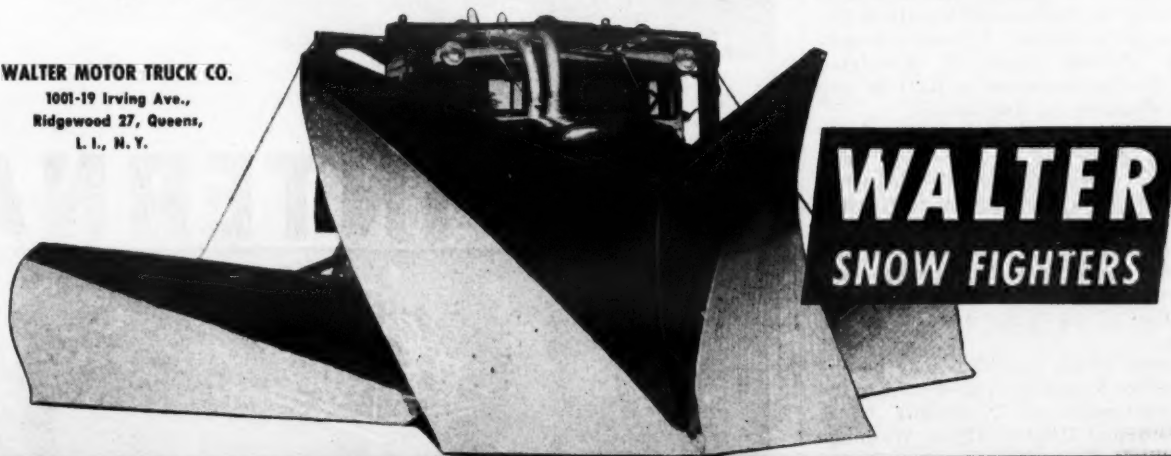
With the plows removed, Walter Snow Fighters give you outstanding heavy-duty trucks for service on and off the highway. They keep busy on road scraping and maintenance, construction jobs, hauling, emergency work, etc.

• YEARS OF SERVICE

Many Walter Snow Fighters are still operating at top efficiency after 10, 15 and 20 years of constant service. You can expect the same from today's advanced Walter Snow Fighters.

See your Walter distributor for full details—or write us for literature.

WALTER MOTOR TRUCK CO.
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L. I., N. Y.



WALTER SNOW FIGHTERS



This is the 20-inch-blade model of the new McCulloch powered chain saw, featuring an automatic clutch and a 360-degree swivel. Blades and chains are also available in 36, 48, and 60 inches.

Powered Chain Saw Has Automatic Clutch

A powered chain saw for one or two-man operation has been developed by the McCulloch Motors Corp., 6101 W. Century Blvd., Los Angeles 45, Calif. The power unit is a 2-cycle 5-hp gasoline engine with a total weight of 38 pounds. Blades and chains are available in lengths of 20, 36, 48, and 60 inches.

The McCulloch saw has an automatic clutch and a 360-degree swivel. According to the manufacturer, the automatic clutch disengages at idling speed and stops the saw chain from moving. To start sawing again, it is necessary only to open the throttle; no manual clutch action is required. This feature prevents the engine from stalling if the chain becomes jammed, the company explains; also, if the engine is shut off, it can be started again without removing the saw from the cut.

The 360-degree swivel is designed to permit sawing at any angle while holding the saw in the most comfortable position. Blade-angle adjustments are made by lifting a clamp and turning the blade assembly. Click stops are provided for indexing the blade to specific angles; however, the blade can be locked at any angle desired. The manufacturer points out that it is not necessary to angle the blade for notching or other temporary angle cutting, since the power unit will operate efficiently at any angle for an unlimited time.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 9.

Road-Grader Tires

A new line of road-grader tires is in production at the plant of the Pennsylvania Rubber Co., Penn-Craft Park, Jeanette, Pa. These tires feature an extra-heavy cord body and a tread and shoulder of specially compounded rubber designed to give increased resistance to cuts and snags. The tires will withstand the hard usage given by contractors and road builders, says the manufacturer.

The tires are available in all sizes and plies from 9:00 x 24 through 13:00 x 24 in the vacuum-cup cleated type, and in sizes 7:00 x 24 through 9:00 x 24 in the rib type.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 39.

Concrete-Pipe Reinforcing

Standards for welded-wire-fabric reinforcement for concrete pipe have been set up by the Commodity Standards Division of the National Bureau of Standards. Printed copies of "Simplified Practice Recommendation R234-48" are now available for distribution.

The recommendation lists 63 styles of fabric, in place of the 311 styles which were formerly used in the industry. It gives the area of longitudinal wires per linear foot of fabric, and the spacing and gage of longitudinal and transverse wires for each of the recommended styles of fabric. Sketches show the location of the wires in place in the pipe.

Copies of the standards may be obtained for 5 cents each by writing to the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

Engineer Shortage Is Contest Subject

A national essay contest designed to awaken interest in the critical shortage of engineers in highway departments is now underway under the sponsorship of the American Association of State Highway Officials. The contest is aimed at engineering schools and is divided into two divisions: the Faculty Member Division and the Student Division. A winner will be selected from each division and will be awarded a trip, all expenses paid, to the 35th annual meeting of the Association in San Antonio, Texas, in October, 1949. The winning papers will be presented by their authors before a general session of the meeting.

The highway officials hope that the contest will stimulate the interest of students and faculty members alike in the highway-department personnel shortage, and that this interest may lead to other steps that will, in some degree, alleviate the present situation.

Essays written by civil-engineering faculty members are to be on the subject "What I Advise My Students With Regard to Selecting Highway Engineering as a Career". Subject of the students' essays is to be "What I Think of Highway Engineering as a Career". Students eligible to participate are those in their junior year who are enrolled in a course of study leading to the degree of Bachelor of Science in Civil Engineering, or the equivalent degree. Entries are to be submitted by

March 1, 1949, and winners will be announced between June 1 and 8, 1949.

For further information on the rules of the contest, write to the American Association of State Highway Officials, 1220 National Press Bldg., Washington, 4, D. C.

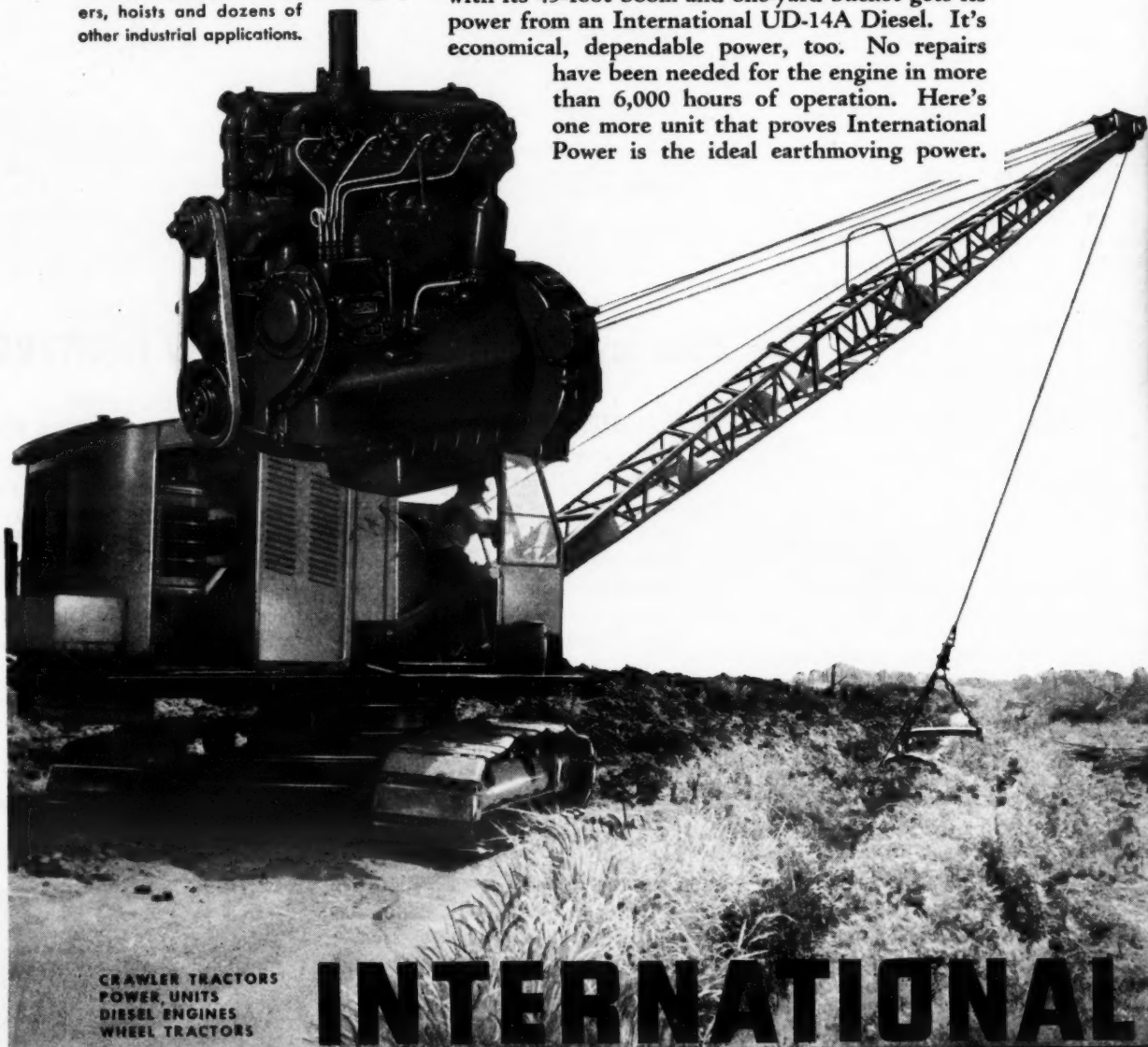
Staacke to Hewitt-Robins

C. W. Staacke has joined Hewitt-Robins, Inc., as a technical consultant. He occupies a newly created post in which he will serve as technical coordinator of the research and development activities of the company. His office will be located at 370 Lexington Ave. in New York City. Mr. Staacke was formerly with the engineering staff of the B. F. Goodrich Co.

EARTHMOVING POWER— by INTERNATIONAL

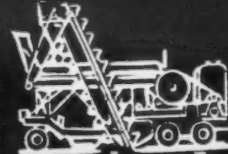
The International UD-14A Diesel delivers 76 working horsepower. You'll find it powering generators, rock crushers, hoists and dozens of other industrial applications.

Averaging 70 yards of earth an hour, this dragline with its 45-foot boom and one-yard bucket gets its power from an International UD-14A Diesel. It's economical, dependable power, too. No repairs have been needed for the engine in more than 6,000 hours of operation. Here's one more unit that proves International Power is the ideal earthmoving power.



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POWER UNITS
DIESEL ENGINES
WHEEL TRACTORS

INTERNATIONAL



AISC Convenes in Canada

The American Institute of Steel Construction recently held its 26th annual convention in Quebec, Canada. Items on the agenda included the election of officers and the presentation of a series of papers. A record attendance for the AISC was rung up when 625 members and guests registered at the meeting.

Retiring President T. R. Mullen, head of Lehigh Structural Steel Co., announced that the fabricated-structural-steel industry is ready to operate any Governmental plan of production in the event of war, with a minimum of delay. Wilfred Sykes, President of Inland Steel Co., charged that an attempt is being made "to put American business in a straight jacket". He especially attacked

recent Supreme Court decisions in the cement case, outlawing the basing-point system of distribution. He said the Federal Trade Commission and the Supreme Court "follow some theory, without actual experience in business or concern for the welfare of industry".

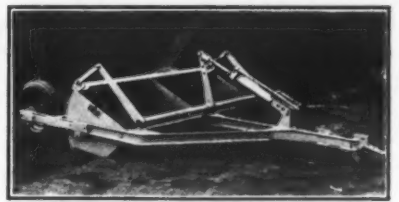
David Austin, Vice President, United States Steel Corp., said that post-war expansion of steel-making facilities is costing the industry \$1,600,000,000 and that any more drastic program might result in idle plants owing to shortages of raw materials and man-power. Jonathan Robinson, Minister of Mines of Quebec Province, spoke about the new Labrador iron-ore development. He said that it will cost in the neighborhood of \$300,000,000 before ore is brought out, but that the deposit will yield 300,000,-

000 tons. He also described another ore field, rich in titanium-bearing iron, located in Ungava, within Quebec Province.

N. R. Patterson, President of the Patterson Steel Co. of Tulsa, Okla., was elected President of the AISC for the coming year. The 1949 convention is scheduled to be held at White Sulphur Springs, W. Va.

Simplex Official Dies

Eugene T. Scott, formerly Sales Manager of Templeton, Kenly & Co., died last September at Hinsdale, Ill. He had retired from active duty with the company early in 1948 because of ill health, although he continued to serve on the Board of Directors until his death.



The Jumbo 6, 7, 8, 12, and 14-foot leveler scrapers have two-position wheels. With the wheels in the rear, they perform as levelers; with the wheels in the forward position, as scrapers.

Light-Duty Scrapers Made In Three Styles

A line of light-duty scrapers is manufactured by the Jumbo Steel Products Co., P. O. Box 365, Azusa, Calif. These units include 4 to 7-cubic-foot rotary wheel scrapers; 6 to 14-foot leveler scrapers; and 4 to 6-foot drag scrapers.

The rotary wheel scrapers are adaptable for use with tractors in the 15 to 75-hp range, and spread a normal load of from 22 to 75 cubic feet. Loading and dumping controls are located at the side plates of the bowl to relieve undue strain on the operating parts. The 4-foot model weighs 900 pounds, spreads a normal load of 22 cubic feet, and requires from 10 to 15 hp; the 5-foot model weighs 1,100 pounds, spreads a load of 25 feet, and requires 15 to 20 hp; the 6-foot model weighs 1,200 pounds, spreads a load of 32 feet, and requires 15 to 25 hp.

The Jumbo 6, 7, 8, 12, and 14-foot leveler scrapers are dual-purpose implements with two-position wheels. With the wheels attached in the rear position, the implement performs as a leveler; with the wheels in the forward position, it performs as a scraper. Three adjustable cross-shaft arms provide adjustments for cutting, moving, and spreading cuts of various thicknesses. The Jumbo scrapers are hydraulically controlled.

The Movmor 4, 5, and 6-foot drag scrapers are equipped with balance-type bowls designed to tilt back automatically into carrying position when loaded. Loads can be dumped while the tractor is in motion. Adjustments are provided for changing the digging depth and amount of spread. The 4-foot Movmor weighs 440 pounds and spreads a load of 12 cubic feet; the 5-foot unit weighs 570 pounds and spreads a load of 18 cubic feet; the 6-foot model weighs 720 pounds and will spread 22 feet of material.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 64.

Data on Hydraulic Hoists In the 25 to 100-Hp Range

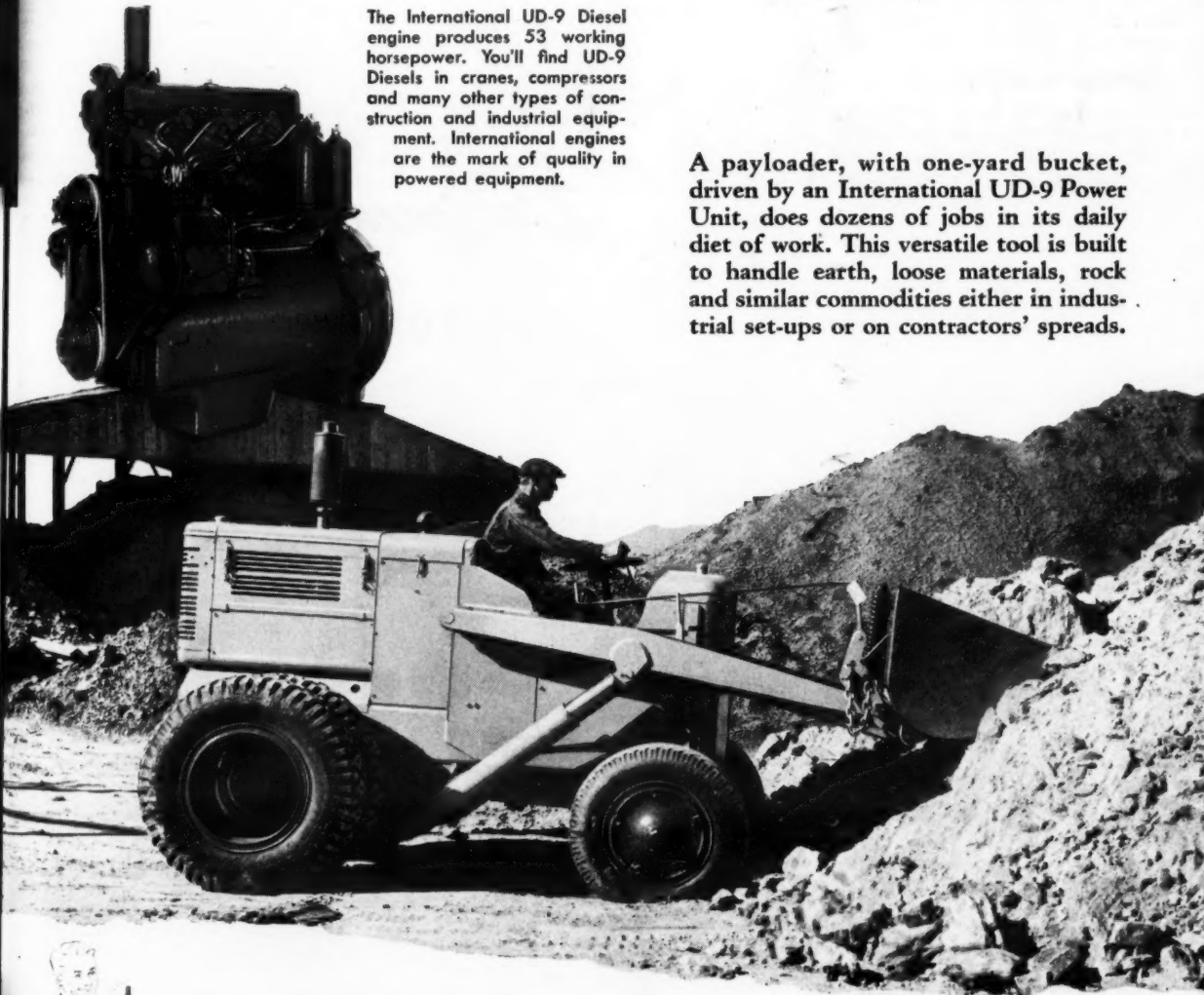
Two-speed hydraulic hoists in a capacity range of from 25 to 100 hp are described in literature prepared by The Jaeger Machine Co., 701 Dublin Ave., Columbus 16, Ohio. Catalog HU-8 describes the Utility models in the 25 to 40-hp range, and Catalog HE-8 describes the Erector models in the 60 to 100-hp range. Both models feature an automotive-type transmission and hydraulic finger-tip control.

Technical data presented in both catalogs include: a chart for computing hoist horsepower, line pull, or line speed when any two of these are known; a table of the breaking strength of wire rope of several styles and in diameters of from 1/4 to 1 inch; a list of the wire-rope capacities of Jaeger hoists; weights of several materials commonly handled by clamshell buckets; typical loads handled in material elevators, tower buckets, and mast-hoist operations; and a method for determining pulley ratios for various pulleys.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. For Catalog HU-8, circle No. 52; for Catalog HE-8, circle No. 53.

The International UD-9 Diesel engine produces 53 working horsepower. You'll find UD-9 Diesels in cranes, compressors and many other types of construction and industrial equipment. International engines are the mark of quality in powered equipment.

A payloader, with one-yard bucket, driven by an International UD-9 Power Unit, does dozens of jobs in its daily diet of work. This versatile tool is built to handle earth, loose materials, rock and similar commodities either in industrial set-ups or on contractors' spreads.



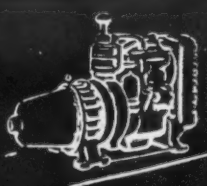
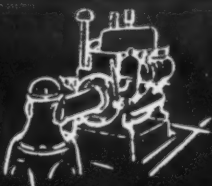
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powered earthmoving equipment. You'll find International engines pay big dividends in freedom from down time, and in work done. It's wise to remember—wherever you need an engine—you need an International. INTERNATIONAL HARVESTER COMPANY, CHICAGO

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Industrial Power



Building Contractor Races Winter Season

Permanent Buildings Are Pre-Cut and Concrete Pours Hurried to Beat Winter Freeze-Up at Dam

SPARKED by an alert contractor, building-construction crews have been rushing pell-mell to beat Old Man Winter's deadline at Hungry Horse Dam in Montana. By using the most modern methods of pre-cutting and prefabricating the materials in a central yard, and by concentrating on concrete foundation work while the good weather lasted, they showed promise of reaching their goal.

The job at Hungry Horse Dam is a \$500,000 building contract for the U. S. Bureau of Reclamation. Askevold Construction Co. of Missoula, Mont., is the contractor, with personal on-the-job direction by S. M. Askevold himself, as well as G. J. Patterson, General Superintendent.

Under this contract are being constructed many of the permanent buildings which will remain in service at the dam town of Hungry Horse, Mont., after the dam has been finished. The buildings include 14 permanent five-room houses, 6 six-room houses, a 24-room dormitory, a 10-stall automobile parking garage, a new office annex 36 x 140 feet, a guard and tourist information booth 22 x 45 feet, and miscellaneous sewer, water, and utilities work. Started

July 28, the work is now well along, and by March 1, 1949, the buildings should be ready for the Bureau of Reclamation.

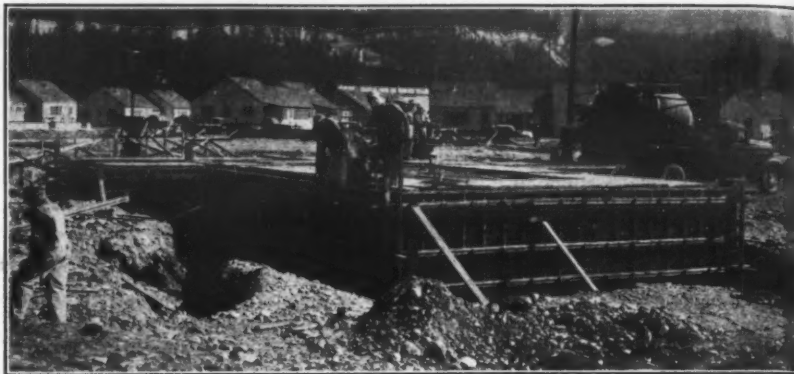
The controlling factor is the weather. That is why concrete work on foundations has been the focal point of activity thus far. If all the foundations could be finished and the rough framing and roofs done, the insides of the buildings could then be finished through the winter months, the contractor reasoned. Fall rains usually begin about October 1 in the area, and snow sets in some time in November.

Organization of the Job

The job was therefore organized on an assembly-line basis, to move men, equipment, and materials to the sites in an orderly flow. By prefabricating everything possible in a central yard, carpenter work was made more efficient. Where prefabrication could not be done, the lumber was pre-cut to dimension and assembled on the job.

Machines Start Excavation

All of the houses have basements, so a great deal of structural excavation was necessary. The house basements and foundations were excavated by two machines, a Northwest ¾-yard clamshell, and a truck-mounted Quick-Way shovel rigged as a backhoe. The latter machine could move over the paved streets anywhere in the Bureau



C. & E. M. Photo
Concrete work hums along on a house foundation at the dam town of Hungry Horse, as a Hansome truck-mixer discharges concrete to buggies which wheel it to the pour. Askevold Construction Co. is the building contractor.

of Reclamation area without disturbing the bituminous mats.

Material from the excavations was disposed of in the immediate area, and smoothed off by a Cletrac and an Allis-Chalmers-mounted bulldozer. In fact, there was not enough of the excavated material to fill in around the area, and

more material will have to be hauled after the building job is finished.

The Quick-Way truck-mounted backhoe was also used to good advantage excavating the trenches for water, sewerage, and other facilities through the area.

(Continued on next page)

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Provide...

**FASTER
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**INCREASES
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**REDUCES
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DRIVER FATIGUE**

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One installation will prove to you and your operator the efficiency gained by Garrison Hydraulic Steering Boosters. Installations can be made on most heavy duty trucks, wheel tractors, truck cranes, graders.

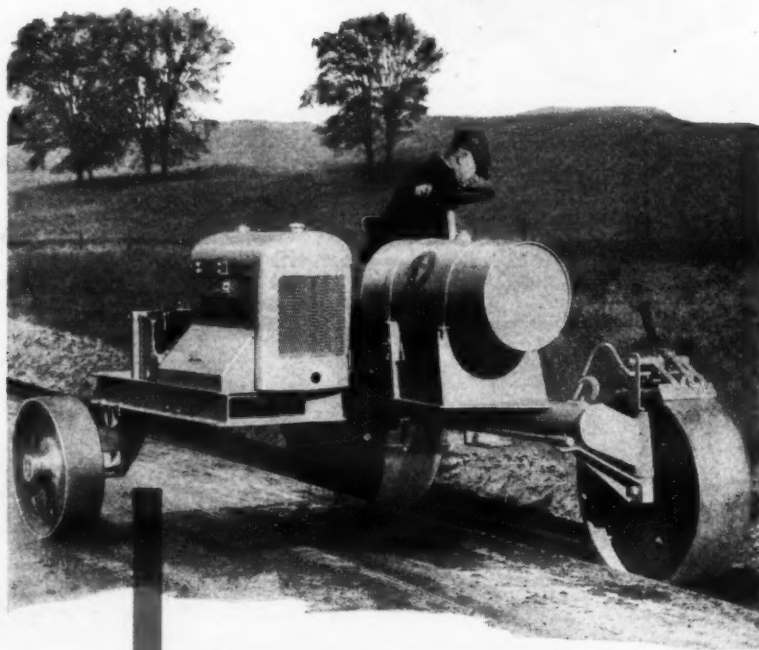
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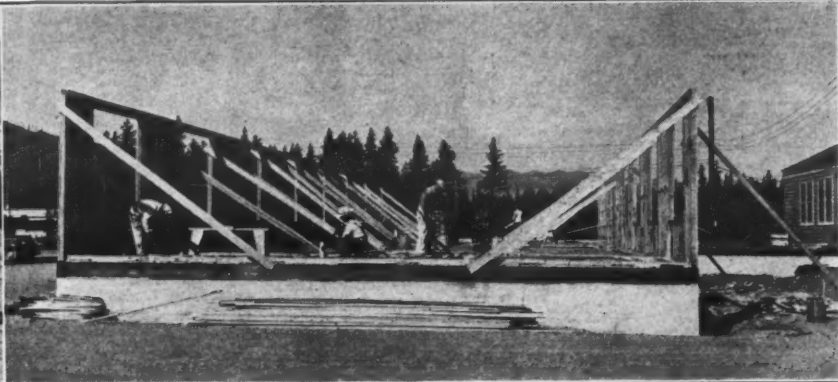
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FOR THE JOB



Compacting widening strips and trenches economically and efficiently is the prime purpose of this roller. The leveling roll can be adjusted to permit compaction at a range of depths by means of a simple, low pressure hydraulic leveling mechanism. Compressions exceeding 300 lbs. per inch of face can be obtained with this roller.

BUFFALO  **SPRINGFIELD**
SPRINGFIELD, OHIO



C. & E. M. Photos

Carpenter Foreman Otto Opsahl and Carpenter Superintendent E. G. Peterson, in the foreground of the picture at left, watch workmen setting up form panels to fine wire lines. Above, more workmen in the Askevold building-construction job at Hungry Horse Dam start to frame the administration building annex of the U.S. Bureau of Reclamation.

Carpenter Yard Set Up

A central carpenter yard was set up on the job, in which all the prefabrication and pre-cutting work was done. The yard was laid out in a neat pattern, with space along the back of the lot for loads of lumber. Fir, tamarack, and pine lumber was trucked to this point from yards in Kalispell, Mont., about 25 miles from the dam.

Near the lumber storage piles were the power saws and feeder tables on which the lumber was cut. Two radial saws, a DeWalt and a Red Star, were used there. Both machines had equipment and gages which permitted them to turn without difficulty to almost any angle, cutting lumber to any dimension required on the drawings.

The cut lumber then continued its assembly-line move out to a space in front of the saws, where carpenters busily built the material into the finished panels or members. When the process was completed, the panels were very close to the street, where it was easy to load them out to the flat-bed truck which took them to the job.

Foundation-pour forms, stairsteps, wall panels, and many other such parts of the buildings were put together there and sent out to the job. Also located in the yard was a small shed where radial saw blades and hand saws were sharpened.

Warehouse and Batch Plant

A warehouse and batch plant were also set up at one end of the carpenter yard. The warehouse was used to store cement, plywood, and other such valuable items as well as some of the plumbing and electrical fixtures.

The batch plant consisted of a Butler 45-ton batching bin with three compartments. The two truck-mixers used on the job backed into this plant to take on their loads. Sand, pea gravel, and 1½-inch gravel were batched out manually on beam-type scales, and dumped to the truck-mixers. Lehigh sack cement from Spokane, Wash., was used, and water was added at the plant—50 gallons for each batch.

A 3-cubic-yard batch was sent out of the plant, consisting of 3,660 pounds of sand, 5,682 pounds of gravel, and 15 sacks of cement. The plant was about a mile from the farthest point of haul on the job.

Concrete Work Pushed

With good weather prevailing through

late August and early September, concrete operations were pushed to the limit. Efforts were made to form and pour a building foundation each day. Since the foundation for each 6-room

house contained 80 separate prefabricated form panels, this was no small task.

The form panels were hauled out to the house sites, where USBR sur-

vveyors had previously set reference points and grades. The panels were then set to line and grade, as established by tight wires stretched over the

(Continued on next page)

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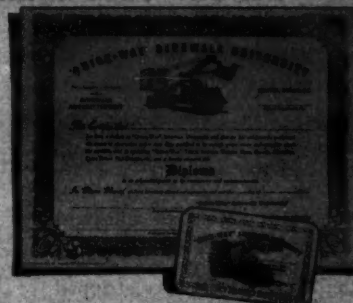
INTERCHANGEABLE PARTS — SIMPLICITY: Minimum of parts, many interchangeable, all easy to reach. Low first cost, low maintenance.

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No matter what larger equipment you own, you need "QUICK-WAYS" too.

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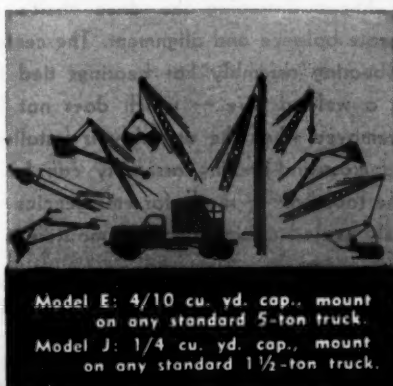
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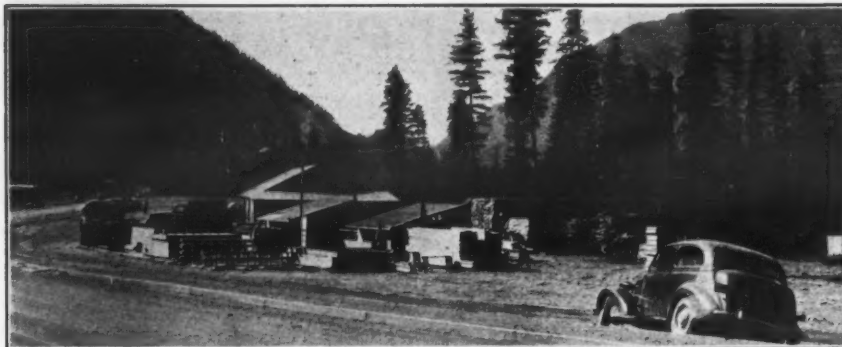


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C. & E. M. Photos
This central carpenter yard on the Askevold contract was the scene of all prefabrication and pre-cutting work. The close-up at right shows stacked lumber, the radial saws in the center, and the assembly yard.

Building Contractor Races Winter Season

(Continued from preceding page)

survey points, and tied together with spacers and tie-rod wires. Form panels were made in such a way that the basement walls and the foundation above ground were poured monolithically. The panels varied from 4 to 10 feet in length.

All the inside panels where concrete would be exposed inside the basement were faced with plywood nailed to 2 x 4 studs on 16-inch centers. The outside panels were faced with 1-inch tongue-and-groove material, with plywood above the ground level.

After the forms were set, they were braced against spreading by falsework, which also carried a 6-foot-wide pouring platform around the inside of the foundation. This falsework was made up of 2 x 8's, criss-crossed across the building at the top and bottom of the form. These cross ties were then braced with 2 x 4 lumber, and a 2 x 10-inch decking placed inside at the top.

Pouring equipment consisted of a Rex Moto-Mixer and a Ransome truck-mixer. These machines backed in to a pour, and discharged their concrete to two CMC concrete buggies working on the platform. The buggies then wheeled the concrete to the point of pour, and dumped it in the forms. A small prefabricated wood baffle, made to fit over the forms with cleats, was moved around from place to place to deflect the concrete down into the forms.

The concrete was placed with a slump of about 2 inches, and was vibrated by a Chicago Pneumatic vibrator, powered by a small Jaeger portable air compressor. The concrete was placed in thin lifts, kept fairly level in the forms for uniform loading. Steel reinforcing bars were slipped in at the proper levels as the concrete came up. When the concrete reached the right elevation, pre-cut creosoted sills with anchor bolts were set in place, and the foundation was complete.

After the form panels were stripped, the concrete above ground was cured with Hunt Process white curing solution, and then the lower part of the concrete was painted with a coal-tar waterproofing preparation. After the forms had been removed on the inside, the basement floor was fine-graded by hand. Then the floors were poured by the same equipment. The floors were keyed monolithically into the

basement wall footings, to preclude the possibility of any ground water seeping in.

Framing Pre-Cut

Framing was done individually, of course, but according to the general (Concluded on next page)

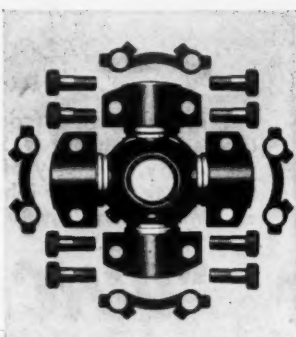


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MECHANICS Roller Bearing UNIVERSAL JOINTS can be removed and replaced — on the road — in 20 minutes — with a wrench and hammer — without disturbing the drive shaft's original accurate balance and alignment. The center cross-and-bearing assembly has bearings tied together with a welded wire — which does not have to be removed when the assembly is installed. An extra cross-and-bearing assembly can be carried in the tool box — ready for emergencies — completely sealed against dirt and moisture.



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C. & E. M. Photos

pattern of pre-cutting the members. The 140-foot administration building, for example, had all its side-wall framing pre-cut and trucked to the job. The entire wall panels, 140 feet long, were built lying flat on the sub-floor. They were then raised in one piece, spotted as to location, and nailed in place. Rafters and roofing followed in quick succession.

Side walls, window frames, and so on follow the same pattern for the remainder of the buildings. Since the foundations were done, much of the pre-cutting was finished, and utilities work was in the clear by the first of November, the balance of the work can proceed more leisurely.

Subcontracts have been let on the work for the electrical installations, and for the plumbing and heating. Arnold, Arnold & Jeffries of Spokane, Wash., is doing the plumbing and heating, and Hollingsworth Electric Co. of Kalispell is doing the electrical work. This work is also going on to keep pace with the remainder of the construction on this project.

The finished permanent structures will house personnel stationed at Hungry Horse to operate and maintain the new dam, and will provide a high standard of construction for their homes. All phases of the building work are under the scrutiny of Bureau of Reclamation inspectors, some of whom may later live in the houses they are now inspecting.

Batching-Equipment Data

Six new bulletins on a complete line of batching equipment are available from The Heltzel Steel Form & Iron Co. of Warren, Ohio. These are: Bulletin J-38 on the dustless cement batcher; Bulletin J-40 on the dual cement batcher; Bulletin J-42 on the combination batcher; Bulletin J-44 on the dual aggregate batcher; Bulletin J-46 on the truck-mixer batcher; and Bulletin J-48 on the universal batcher.

These batchers range in size from the 1/4-cubic-yard aggregate type to the 6-cubic-yard combination cement-and-aggregate unit. They are designed for use with Heltzel-built bins rated from 30 to 400 tons in aggregate capacity and from 100 to 1,500 barrels in cement capacity. They can be used for truck-mixer or batch-truck operations and in the central-mix or concrete-products

industries.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 8.

Carpenters in the photo at left are assembling a set of cellar stairs for the permanent buildings at Hungry Horse Dam. On-the-job supervision of Askevold's \$500,000 contract is provided by S. M. Askevold, who is shown at left in the other picture explaining some job procedures to J. G. Simon and L. C. Pierre. The buildings should be ready for the U.S. Bureau of Reclamation by March, 1949.

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TIME AND
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that Hits and Rotates for
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The Igloo water cooler comes in 3 and 5-gallon sizes, with removable spigots available for each size.

Cooler for Carrying and Pouring Water

An important consideration on a construction job is the supply of fresh, cool drinking water. And on large projects, it is also important to have the water supply easily accessible. One of the simplest devices for providing workers with water is the portable container which can be used for transporting as well as pouring the water.

A line of water coolers of this type is made by the Igloo Mfg. Co., 3805 McKinney Ave., Houston 3, Texas. Among the features listed for the Igloo cooler are deep corrugations for strength and durability, reinforced inner bottom, double walls, complete insulation, no soldered joints, and an extra-heavy inner bottom. The coolers come in 3 and 5-gallon sizes with plastic or chrome-plated brass spigots.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 48.

Concrete-Block Unit Is Run by Children

A concrete-block machine is in operation at the George "Junior Republic" in Freeville, N. Y., founded in 1895.

As part of the school's learn-while-doing program, the machine will be used to turn out concrete blocks for exterior and interior walls and foundations of new construction. Manufactured by the George W. Hoffman Corp., 121 Broad St., New York, N. Y., the Prince machine will be operated by boys ranging in age from 12 to 20, and it is expected to turn out about 1,000 blocks per 8-hour day.

The machine was installed by George W. Hoffman, who took a week off from his New York office to show the boys how to mix materials to make the blocks, and how to run the machine most efficiently. The formula he recommended—1 part cement, 3 parts gravel, and 5 parts sand—will produce about 22 blocks for each sack of cement.

The Hoffman machine was selected for its compact and portable design, and because it can be taken apart with only a screwdriver, pliers, and a wrench. It consists of a mixer, rubber-fiber conveyor belt operated by a chain drive, a storage hopper, and a vibrating block machine. The mixer and conveyor belt are powered by a 3-hp electric motor; the vibrator, by a 3/4-hp electric motor.

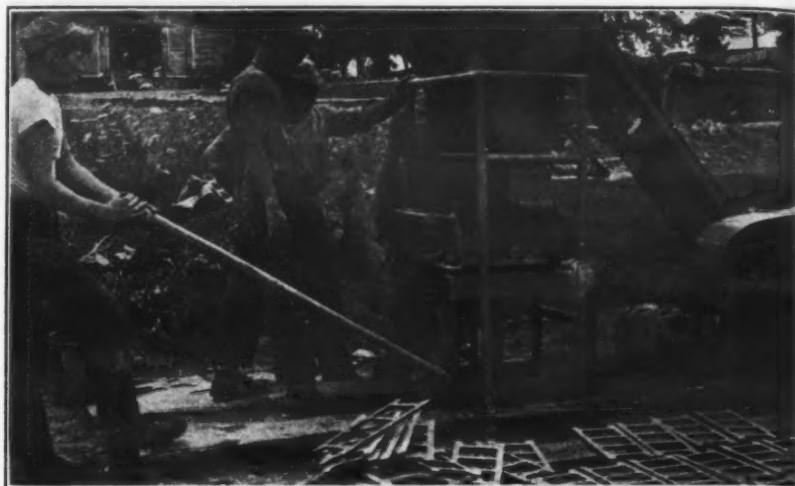
Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 78.

AC and DC Welders

A new group of ac and dc arc-welding machines has been placed in production by the Metal & Thermit Corp., 120 Broadway, New York 5, N. Y. The ac units are of the transformer type and are available in 150, 200, 300, 400, and 500-amp capacities. The motor-driven dc units are available in 150, 200, 300, and 400-amp capacities in new compact 3,600-rpm models and in a conventional 1,750-rpm type. The engine-driven dc welders are available in 200-amp units powered by Wisconsin engines, and in 300 or 400-amp sets driven by Chrysler engines.

Features claimed for the ac units include a built-in power-factor corrector; fingertip, stepless current control; fan-forced ventilation; wide current range; and moderate open-circuit voltage operation. They also provide instant plug-in plug-out of electrode leads by taper-type connectors. Interchanging of leads is avoided by a permanent work-lead connection. A running gear is available where portability is required.

Major design feature of the dc models is a one-dial simplified control panel. The panel carries a series of well marked outlets—one for each electrode of different diameter. In operation, the



Boys at the George "Junior Republic" in Freeville, N.Y., turn out concrete building blocks on a Hoffman Prince machine as part of their learn-while-doing program. In the background is "Pop" Grace, the Republic's instructor in mechanics.

electrode is plugged into the proper outlet, after which the dial is set for any required adjustment in current.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 17.

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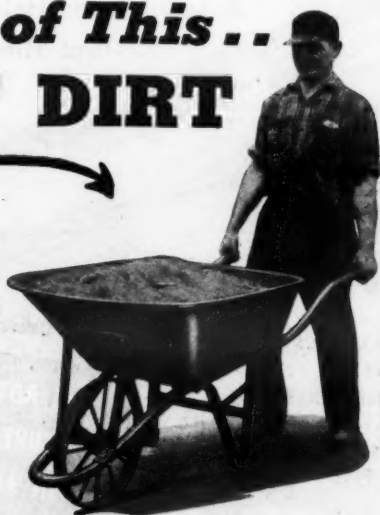
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Sterling Tubular Framed Barrow — all-welded, no rivets, lapped at corners. Steel reinforcing rod around top edge.

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STERLING Quality

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New Road Paved To Serve Airport

**22-Foot Concrete Slab
Is Paved With Formed
Keyways to Ease Future
Widening Costs**

BETWEEN the city of Cedar Rapids, Iowa, and its municipal airport, Booth & Olson, Inc., of Sioux City has just finished an important traffic link for the Iowa State Highway Commission. At a cost of \$376,755.95, this contracting firm completed a new 22-foot portland-cement concrete highway 6.7 miles long. It features formed keys in the side of the pavement slab to allow for future widening if traffic needs become that great.

For the first 1½ miles out of Cedar Rapids, additional 11½-foot widening strips were placed on both sides of the pavement under the Booth & Olson contract. The remainder of the job is standard 2-lane construction. Bridges across three streams were constructed under another contract; the Booth & Olson contract included only concrete paving and shoulder construction.

The new highway is of reinforced concrete. The 22-foot section is 10 inches thick at the edge, tapering to 9 inches in thickness 3 feet from the edge of the slab. Grading had been done under another contract, and the slab was laid down on the compacted earth subgrade. This consisted generally of a heavy clay soil.

Preparing Subgrade

A Caterpillar 212 and an Allis-Chalmers diesel motor grader on the job dressed the grade ahead of concrete work. Superintendent Don Allen, Booth & Olson's top-notch concrete-paving organizer, also brought in an International TD-14 tractor with a Bucyrus-Erie 10-yard scraper to do any necessary dressing or filling.

After the grade had been dressed reasonably true by these machines, a Cleveland Formgrader moved in to excavate the shallow ditches in which the steel forms were set. This machine cut its trench to a straight line established by survey points and a taut string.

Allen used 3,000 road-feet of new Heltzel 10-inch steel forms to contain the concrete. In general, he kept these forms laid out about 1,000 feet ahead of paving operations, though this varied from day to day, of course, depending on the amount of footage that was poured. Always, the forms filled one day were stripped and moved ahead the next. The labor crew for form setting consisted of a foreman, a pin driver, four laborers who trimmed form trenches, a form liner, and his helper.

A Jaeger form tamper was used to



C. & E. M. Photo

A Koehring 34-E Twinbatch paver, which Booth & Olson used to pave the new road to the Cedar Rapids airport, dumps a batch of concrete on the subgrade, as an International batch truck pulls away.

tamp the earth securely under the form bases. This ingenious little machine also dispensed form oil at the same time. When the forms were in place and staked, the subgrade was ready to be shaped to its final cross section ahead of paving.

A Buckeye RB Power Finegrader did this work. Very little excess dirt had been left behind the motor grader, but this was cut out by the Buckeye machine and dumped outside the forms along both shoulders. About ½ inch of material was also left in place for the

tail blade to remove. After the machines had worked over the subgrade, a small International tractor with concrete roller wheels compacted the soil and smoothed the subgrade.

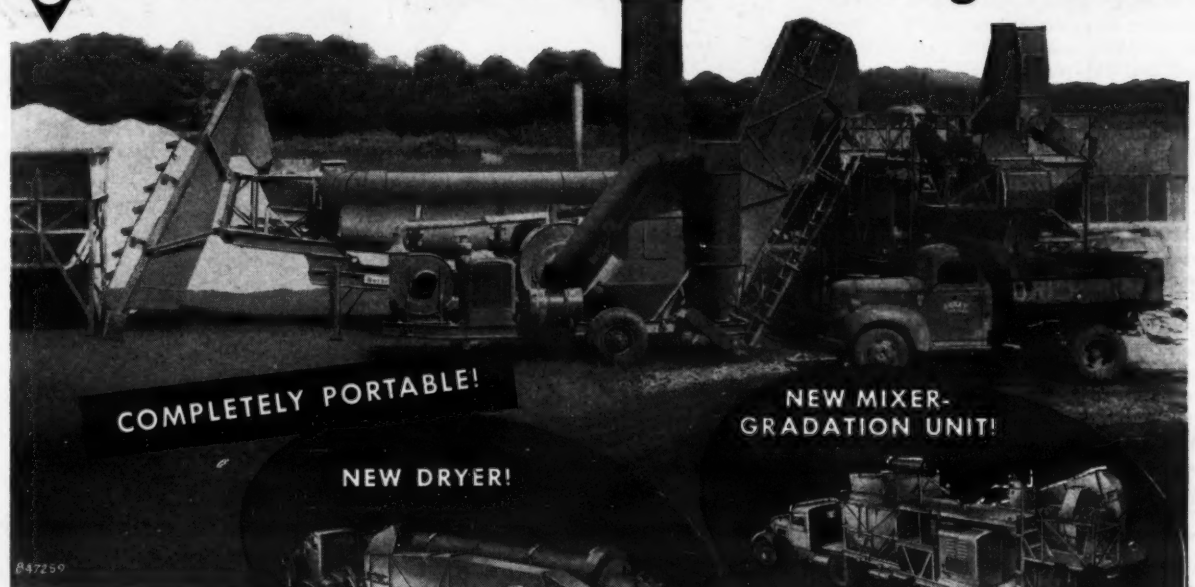
Wood forms for the keyways along the side were also placed ahead of paving. These were centered in place along the steel forms, and staked down with steel pins on which welded supports had been mounted above and below the keyway. These pins were so designed that they could be readily removed after concrete had covered the form.

Steel reinforcement consists of four ¾-inch longitudinal bars, two in the center of the slab 24 inches apart, and the others near the edge. Steel cross-bars ½ inch in diameter were staggered on either side on 48-inch centers. The center longitudinal joint consists of a 2¼-inch strip of Flex-Plane asphaltic material set flush with the surface of the concrete.

In general, the slab was designed
(Continued on next page)

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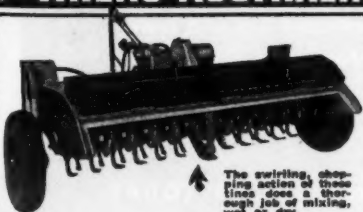
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The swirling, chopping action of these lines does a thorough job of mixing, wet or dry.

HERE'S equipment designed especially for mixed-in-place construction—to operate in connection with other general purpose equipment. Whatever aggregates are used it thoroughly pulverizes, mixes and serves aggregates with binder—rapidly and economically. Also ideal for soil cement stabilization. Safe to use in standard sizes, 4', 5', 6' and 7'. Write for details.

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C. & E. M. Photo
Booth & Olson's Johnson batch plant viewed from the top of Hawkeye Downs race-track stadium near Cedar Rapids.

New Road Is Paved For Airport Traffic

(Continued from preceding page)

without expansion or contraction joints. There were only a few 1-inch expansion joints located near the bridges.

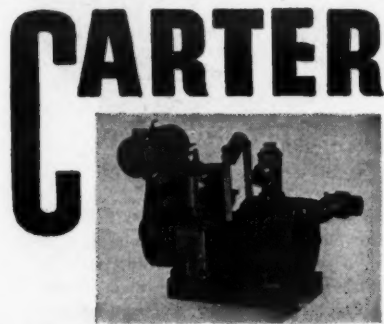
Batch-Plant Layout

Superintendent Don Allen decided that one set-up of his batching equipment would pour the entire job. He expected little difficulty, since all traffic was detoured around the project. Near the Hawkeye Downs race track, also located along the new highway, was a broad expanse of ground ideally suited to setting up his batching facilities.

The batch plant consisted of a 2-compartment Johnson 80-ton aggregate bin, and a 375-barrel Johnson cement silo. Sand and 1½-inch-maximum rock aggregate was furnished by Concrete Materials & Construction Co. of Cedar Rapids, and was hauled 3.9 miles to the batch plant. The plant was 4 miles from the south end of the job and about 2.5 miles from the north end.

As the sand and rock aggregate arrived on the job by truck, it was dumped and stacked in neat piles near the plant. A Koehring 605 crane with a 45-foot boom and a 2-yard clamshell bucket filled the compartments constantly from the stockpiles of material. On productive days, about 1,000 tons of sand and 1,100 tons of rock were handled.

Bulk portland cement, mostly Alpha and Penn-Dixie brands, arrived at Cedar Rapids in hopper-bottom cement cars. It was unloaded by a screw feed, stored, and transferred to the job.



HUMDINGER SELF PRIMING CENTRIFUGAL PUMPS

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WRITE FOR BULLETIN 4503

RALPH B. CARTER CO.
HACKENSACK, NEW JERSEY

51 PARK PLACE, NEW YORK 7, N. Y.

The dry batches of concrete materials were dropped from the plant to a fleet of 2-batch hauling trucks, and sent out to the paver. Booth & Olson used ten of its own K-7 Internationals, and the remainder of the trucks were mostly Fords, rented on an hourly basis. From 11 to 24 batch trucks were required on the shortest and longest hauls.

The batched material was weighed out to strict specification requirements as follows:

Dry Weights for 37.4-Cubic-Foot Batch	
Cement	834 lbs.
Sand	2,011 lbs.
Limestone, 1½-inch maximum	2,494 lbs.
Water-cement ratio	0.466

Paving Operations

When the batch trucks arrived on the job, they discharged to the skip of a Koehring 34-E Twinbatch dual-drum paver, equipped with a 35-foot boom and a dual-gate bottom-dump bucket. Most of the time the paver was spotted between the forms, making it necessary to omit a few sections of forms at intervals of about 500 feet so the batch



C. & E. M. Photo
Left to right, Booth & Olson's Assistant Superintendent Bud Holland, General Superintendent Don Allen, and "Uncle John" T. DeJong, who was in charge of forms on the contractor's 6.7-mile concrete paving job in Iowa.

trucks could back in to the paving machine. There were a few sections on widened shoulders where the paver

could work outside the forms.

Water for concrete mixing came from a creek which intersected the job near the batch plant. Two Rex 3-inch pumps delivered the water to tank trucks, which hauled it to the Koehring paver. The tanks were attached to the paver by flexible rubber hose, and the tank trucks drove along with the paver as it crawled over the job. Mixing time was a minute, and the concrete was placed at an average slump of one inch.

Steel reinforcement was placed in the slab just ahead of the concrete dump. Four ½-inch round steel bars were used longitudinally, two along each edge and two in the center of the slab. The two edge bars were laid ahead of the paver, and the two center bars were placed each 12 inches from the center line of pavement. The bars were supported on steel chairs midway in the slab, the center bars being placed after the paver had passed, but before concrete was dumped.

Transverse steel reinforcement con-

(Concluded on next page)



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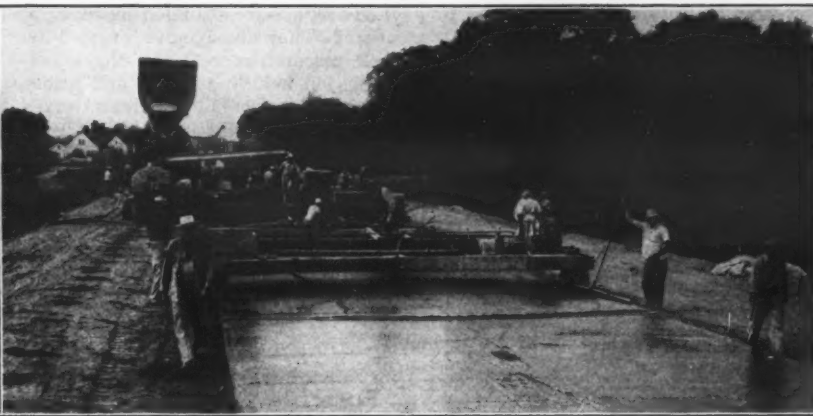
The outstanding performance records achieved by Eaton 2-Speed Truck Axles are the result of sound engineering and exclusive construction advantages.

Only Eaton Axles have the rugged planetary design and the Forced-Flow Oiling System—features which contribute to greatly increased life and lower maintenance cost. See your truck dealer for complete information about Eaton 2-Speed Truck Axles.

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C. & E. M. Photos

sisted of ½-inch round steel bars extending from the edge of the slab to a point 24 inches across the center line. These bars were alternated on 24-inch centers, were also supported on steel chairs in the center, and were tied with wire to the longitudinal steel.

The Koehring paver was hardly out of the way before the steel crew had the reinforcing bars in, ready for the concrete to dump. Steel was supported along the edges by a lifting wheel at the front end of the spreader, which raised the steel from underneath and supported it during the placing of concrete. In general, the concrete was dumped first along the center line, and then in towards the steel forms.

The line-up of paving and finishing machines, in the order of their appearance, was as follows: the Koehring paver, a Jaeger concrete spreader, a Jaeger-Lakewood finisher dragging a Flex-Plane center-joint machine, hand floats, and curing equipment.

As the Jaeger spreader worked the concrete evenly between forms, a Jackson surface tube vibrator on the rear end of the machine consolidated the mix. The Jaeger-Lakewood machine put the initial finish on the concrete, and a 2¼-inch strip of asphaltic mastic center-joint material was set flush with the slab by the Flex-Plane machine. Hand work consisted of manipulating long-handled floats and straight-edges, edging near the forms, and pulling a belt finish. The concrete slab was covered with Sisalkraft blankets and kept wet for 24 hours, after which the blankets were removed. The concrete surface was then checked with a straight-edge, a few high spots were ground off, and the final cure was applied. This consisted of black asphalt cure with white-wash added, a product of R. L. McKenzie Co., Inc., of Des Moines.

The next step was the construction of new shoulders along the new highway, filling in around the formed keyways on both sides of the slab. Later on, when traffic justifies widening the road, these keys will be there to help support the slab along the joint.

Completion of this new road is a part of Iowa's long-range plan of strategically located high-type highways. From year to year, this plan is making available to citizens of the state more

and better highways.

Personnel

The job was designed and directed under the general supervision of Fred R. White, Chief Engineer of the Iowa State Highway Department, with A. A. Baustian as Engineer of Construction.

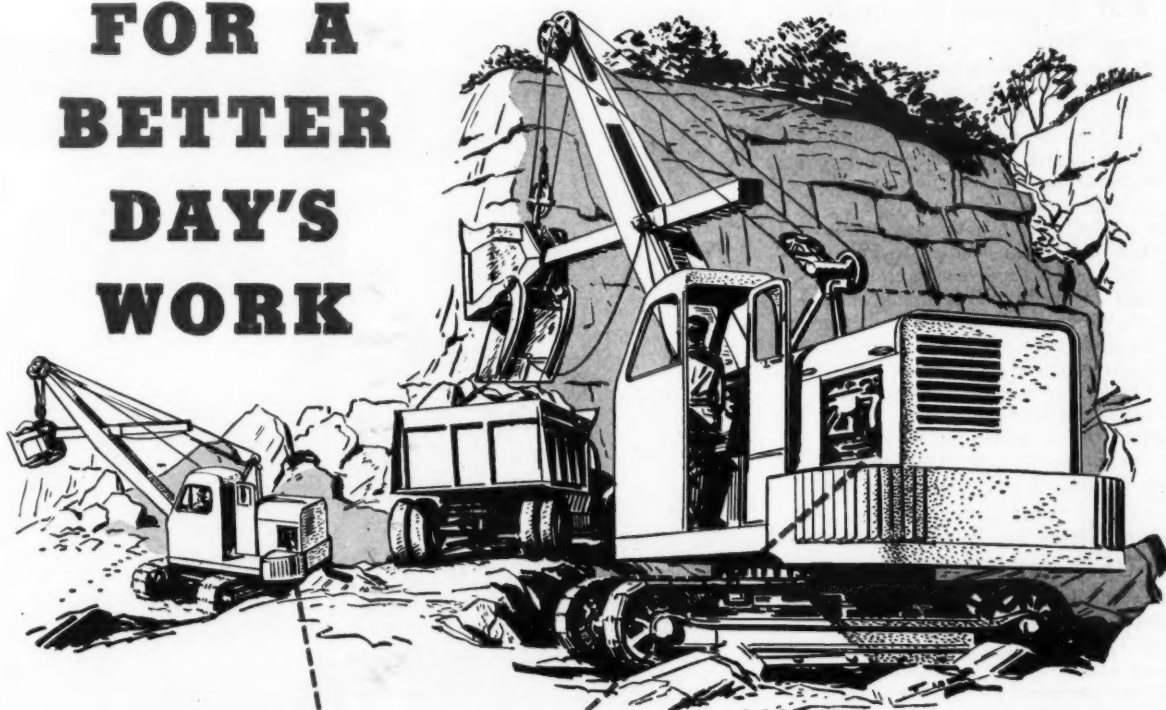
John T. DeJong, standing in the foreground of the picture at left, supervises the loading of Heltzel steel forms to the special flat-bed truck he used on the Booth & Olson paving job in Iowa. The photo at right, taken from the finishing end of concrete operations, shows hand finishing, belts, and equipment line-up behind.

Charles Fisher was Resident Engineer.

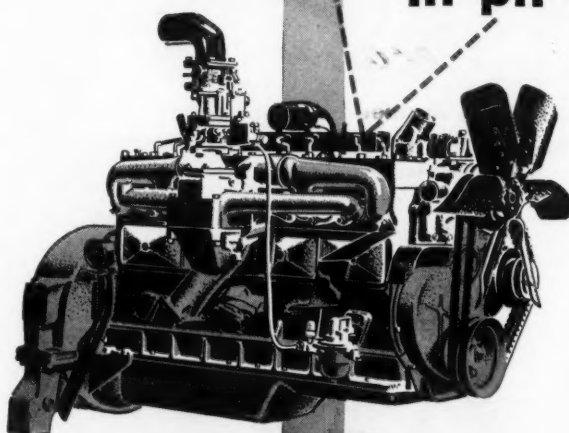
George L. Booth, President of Booth & Olson, Inc., was represented on the job by Don Allen, his ace Gen-

eral Superintendent; Bud Holland, Assistant Superintendent; "Uncle John" T. DeJong in charge of forms; and Pat Stone in charge of concrete placing.

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Write today for full information and circular

BERNER ENGINEERING CO.
1955 Lafayette St., Santa Clara, Calif.



In the top photo, a Quick-Change bit is driven into its holder on a digging bucket. Below, the bit is driven out of the holder by a sharp hammer blow on a drift pin.

Replaceable Teeth For Digging Buckets

Replaceable teeth for digging buckets, and frames to hold them, have been developed by the Findlay Division of Gar Wood Industries, Inc., located at Findlay, Ohio. According to the manufacturer, only a hammer is needed to replace the Quick-Change bit—no bolts, keys, or special tools are required.

The holder, which is bolted to the bucket, has a wedge-shaped socket or cavity designed to receive a corresponding shank in the bit. This shank has a V-spline which holds once it is driven into the socket. To remove a worn bit, a drift pin is placed in a slot in the bit holder and a sharp hammer blow on the pin causes the bit to pop out.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 34.

Will a Shift in Business Set-Up Lower Your Taxes?

"What business set-up is more advantageous for me these days—partnership or corporation?" The new tax law has caused many contractors and other businessmen to ask themselves this question of late. And to help them answer it, the Research Institute of America has issued its Analysis No. 59 called "Partnership or Corporation Under the 1948 Revenue Act".

As the booklet points out, your legal form of doing business may have been the most advisable one in 1947, but it may not be the most economical one now, from the viewpoint of the tax load. And since that form is not fixed, you need to re-examine the tax issue of partnership vs. corporation, and to answer these four questions: (1) which form will channel the most business profits into the pockets of the individual owners? . . . (2) if the present form isn't the best, what is the cost of changing? . . . (3) can I obtain further tax economies by subdividing the business into two corporations, into one partnership and one corporation, etc? . . . (4) if a change is desirable, how can I accomplish it to gain the greatest tax benefits out of the new form?

Analysis 59 seeks to help businessmen answer these questions. It breaks up the discussion into several sections: making the tax comparison, changing to a corporation, changing to a partnership, danger spots in making changes, the family partnership, forms other than partnership or corporation and which of the two classifications they fall under for taxation purposes, and combinations of business forms. Each section is further divided into smaller topics which are marked clearly by headlines, and specific business situations are cited to illustrate points.

Members of the Research Institute receive bound analyses such as this

when any special situation needs to be covered. They also receive, every other week, research reports and recommendations on handling wages and prices, labor and personnel problems, taxes, etc. In addition, Institute editors issue to members flash warnings of *what to do now* whenever urgent developments call for quick action.

For further information about membership in the Institute or about securing copies of Analysis No. 59 on partnerships or corporations, address The Research Institute of America, Inc., 292 Madison Ave., New York 17, N. Y.

Portable Batching Plants

A line of portable batching plants for aggregate and cement handling is described in a 24-page catalog prepared by the C. S. Johnson Co., a subsidiary of the Koehring Co., located at Champaign, Ill. The bulletin presents cost-cutting ideas for aggregate handling, by means of photographs, schematic drawings, and specification charts.

In addition to setting forth the general requirements for a typical road-builder's plant, the booklet lists various cement and aggregate-batching methods and equipment. Color sketches of typical plant layouts illustrate time and labor-saving features. The booklet also contains a condensed list of state highway department specifications for concrete-paving materials and their handling.

Equipment listed includes the Road-builders all-purpose bin and portable section bin; the Hi-Speed batcher for handling two, three, or four materials; and the Lo-Bin trolley batcher, Little Titan scale, elevating cement charger, all-welded silos for storage, and the Johnson Dutch-Mill cement batcher. Also listed are batch-plant accessories and other Johnson equipment including clamshell buckets, concrete buckets, tunnel gates for belt conveyors, concentric batchers, etc.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 49.

L. S. Oakes and T. A. Scott To Receive '49 Moles Award

Luther S. Oakes of Minneapolis and Thomas A. Scott of New York City have been named to receive the 1949 Moles Award for outstanding construction achievement. The awards will be presented by J. Rich Steers, President of The Moles, at a dinner meeting on February 9, at the Waldorf-Astoria Hotel in New York.

Mr. Oakes is President of Winston Bros. Co., pioneer railroad builder of the northwest, specializing in railroad, dam, flood-control, and drainage work throughout North and South America. Captain Thomas A. Scott is Chairman of the Board of Merritt-Chapman & Scott Corp. of New York City. He brought about the formation of that company by the merger, in 1922, of the T. A. Scott Co. and the Merritt-Chapman Derrick & Wrecking Co. The firm is active in heavy, waterfront, and industrial construction. It also performs marine salvage and lighterage work.

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Uniform Marking Devices For Streets and Highways

A completely new edition of the "Manual on Uniform Traffic Control Devices for Streets and Highways" is now available. It was prepared by the Joint Committee on Uniform Traffic Control Devices, and published by the Public Roads Administration of the Federal Works Agency. This manual is the generally recognized official national standard covering highway signs, pavement markings, traffic signals, islands, and similar devices used in the guidance, warning, and regulation of traffic. In its new form it supersedes the editions of 1935 and 1942.

The text has been entirely rewritten and expanded to provide a clearer, more complete exposition of each subject. Proper use of traffic-control devices is illustrated by 57 drawings and photographs. In addition, 85 signs are portrayed in the margins alongside the appropriate text. Many of the drawings are in color. While basic standards

generally remain unchanged, many refinements and some significant revisions have been made.

The Joint Committee includes representatives of the American Association of State Highway Officials, the Institute of Traffic Engineers, and the National Conference on Street and Highway Safety (now the National Committee on Uniform Traffic Laws and Ordinances). The manual bears the official approval of the three member organizations of the Joint Committee and also of the American Standards Association.

Copies of the manual may be obtained by writing to the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Cost of the manual is 50 cents.

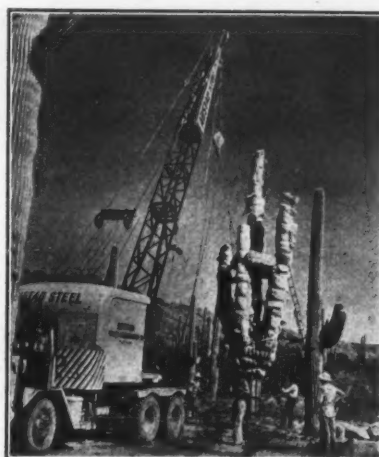
New Marion Shovel Plant

Production operations are under way in the new Cambridge, Ohio, plant of the Marion Power Shovel Co. In addition to manufacturing machines, the Cambridge plant will handle pre-

fabricating work for the main plant in Marion, Ohio. The floor space in the three buildings of the new plant amounts to approximately 100,000 square feet. One building is used for assembly and sub-assembly; one for set-up and welding, and a machine shop; and the third, now being used for storage, is expected to be converted into a manufacturing division for work such as cutting, burning, prefabricating, and layout. Two buildings—covering 21,000 square feet—are being used as warehouses.

Penn Drake Sales Agent

Frank D. Messenger has been appointed a manufacturer's representative by the Pennsylvania Refining Co. He will promote the Penn Drake line of motor oils, greases, gear lubricants, and specialty products in the lower peninsula of Michigan. Sales headquarters are maintained at Fair Haven, Mich. Mr. Messenger is also Sales Manager of Butler Industries.



This Moto-Crane's queer bundled-up burden is a 38-foot-tall saguaro, state flower of Arizona and largest cactus on the Great American Desert. It is about to be lowered into its new resting place on a Tuscon estate after a smooth ride, suspended upright on the crane, from its three-centuries-old desert home.

Flexible-Type Runways Grow Stronger With Use

The flexible type of pavement used for airstrips at 56 Naval and Marine Corps air stations built during the war has greater bearing capacity now than when it was built, the Bureau of Yards & Docks reported at the conclusion of a nation-wide survey. The Bureau's pavement evaluation revealed that flexible-type runways and taxiways—varying in thickness from 6 to 12 inches—can sustain individual wheel loads of from 2½ to 30 tons. This pavement, the Bureau reports, would have had to be from 15 to 45 inches thick had conventional specifications been followed.

Thorough tests of soil conditions as they actually exist under used pavements showed that the subgrade moisture content is much lower and the density much higher than is ever assumed in using the design criteria. These facts have been independently and more recently observed by the Canadian Department of Transport. In addition, it has been found that increased use of the bituminous runways causes increased bearing capacity by increased compaction.

Los Angeles Warehouse For Raybestos-Manhattan

A modern warehouse and office has been opened in Los Angeles by Raybestos-Manhattan, Inc. It is located at 4651 Pacific Blvd., and it will distribute the Raybestos-Manhattan line of industrial rubber goods in southern California. It is under the direction of Schuyler V. V. Hoffman, and is part of the West Coast Division Sales Headquarters located at 131 Mission St., San Francisco.

Light Pavement Breakers

A light-duty pavement breaker is described in a bulletin issued by the R. P. B. Corp., 2751 E. 11th St., Los Angeles, Calif. According to the manufacturer, the Mighty Midget has a cutting-width range of from 4 inches to 4 feet, and will strike at the rate of 55 blows per minute. Photographs show the Mighty Midget at work on two breaking jobs, and an overall picture of the machine illustrates the location of its various parts.

Specifications listed in the bulletin include cutting width, working speed and stroke of hammer, cylinder bore and length, vertical movement of cylinder, driving mechanism, wheel mounting, brakes, and weight of hammer head. Accompanying text describes the operational and performance features of the machine both for cutting pavement and tamping backfill.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 38.

Wire rope takes a beating like this, you ought to check the application"

"The foreman on this job was blowing his top. He was already behind in production when this machine went down. He swore that the wire rope was no good.

"We took a look at the sheaves. They were badly worn. Then I asked him, 'When did you check those grooves?' Nobody on the job could remember when the sheaves had been regrooved.

"We got out a gage. Sure enough, that's where the trouble was. The grooves had worn down so that the proper size gage nowhere near bottomed. Now they're regrooving and I sold him on the idea of letting me check all his equipment. I'll bet we keep his business and his ropes will give twice the service."

AMERICAN STEEL & WIRE COMPANY, GENERAL OFFICES: CLEVELAND, OHIO
COLUMBIA STEEL COMPANY, SAN FRANCISCO
TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

Are you sure you have the RIGHT wire rope for your job!

Are you convinced beyond a doubt that your wire ropes are operating at the lowest obtainable unit cost?

Are you sure that your equipment is contributing fully to long, safe rope life?

If not, you should have a check-up by a TIGER BRAND Specialist—a thoroughly experienced field service engineer.

To show you how the proper application of wire rope can save you money, we have prepared a new booklet to help you check your own operating conditions.

SEND FOR NEW
FREE BOOKLET

American Steel & Wire Company
Rockefeller Building, Dept. O-12
Cleveland 13, Ohio

Gentlemen:

Please send me a copy of your booklet, "Valuable Facts about the use and care of Wire Rope."

Name.....

Company.....

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AMERICAN TIGER BRAND WIRE ROPE

Excellay Preformed

UNITED STATES STEEL





Michigan State Highway Dept. Photos
Two views of winter maintenance in Michigan—at left, a Sno-go at work on M-28 near Baco in Chippewa County; and at right, an Oshkosh truck sanding a section of road to keep it from becoming slippery.

Northern State Set To Laugh at Winter

Armed With New Equipment, Crews In Michigan Are Ready to Battle Whatever This Winter May Bring

THE Michigan State Highway Department is better prepared than ever for its annual job of keeping 9,400 miles of state trunklines free from ice and snow, according to Highway Commissioner Charles M. Ziegler. Armed with new snow plows and sanders, and replacements for worn-out equipment discarded after last year's snow-removal program, highway-department crews are set for another battle against drifting snow and icy pavements. Moreover, they are ready to cope with any unusual storm conditions that may occur.

For most of these men it means being subject to 24-hour duty, and working outdoors when the thermometer hovers around and below the zero mark. In some cases last year, it meant staying on the job as long as 36 hours at a time—especially in the northeast section of lower Michigan, where winter hit the hardest and required the use of heavily concentrated snow-removal equipment.

Equipment

With the additional equipment purchased last year, Michigan's snow-removal arsenal includes 180 snow plows, 120 ice sanders, and 12 rotary plows, operating in all of the counties of the state. Two of the rotary plows are of the wing type; they are mounted on tractor-graders and are intended for use in the deep-snow regions of the north. One is at Mio and is available for use in 13 counties of the northeastern tip of lower Michigan. In emergencies, it can be shifted to southern counties. The other rotary wing plow is located in Manistee to serve the northwestern section of the lower peninsula. Both plows will operate in counties where the Road Commissions handle trunkline maintenance, as well as in areas in which the Highway Department has its own crews.

Each unit has a large rotor fan at the end of the side wing, which can throw the snow 100 feet off the roadway. Its chief purpose is to slice off high road-side banks so that wind currents can blow the highway clear of light snow

which might otherwise accumulate in piles or drifts. By throwing rather than pushing the snow off the roadway during a storm, the plows keep high banks from piling up and making it difficult to clear the road after subsequent storms.

Get Set, Go!

Michigan's snow-removal crews go into action as soon as a snow storm starts, and keep operating until all

trunklines are clear.

Trucks equipped with underbody blades start clearing traveled roads be-

(Concluded on next page)

Motorola FM 2-way radio



YEARS AHEAD OF THE FIELD!

NO OTHER MANUFACTURER CAN MATCH THIS LIST OF *Motorola* RADIO COMMUNICATION "FIRSTS"

first

with noise-compensated squelch that makes present day 2-way radio communications practicable. (U.S. Patent 2343115)

first

to develop the vibrator power supply in receivers—now accepted as the best power supply system.

first

with 20 D.B. quieting at 0.4 microvolt input.

first

to build successfully equipment for the 152-162 mc. band.

first

with "Precision Selectivity" for channel conservation.

first

with Precision Cavity for intermodulation control.

first

with dozens of other major developments in radio communications.

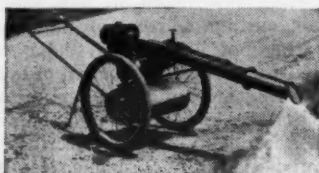
Inspired engineering and careful craftsmanship are your guarantee that the *Motorola* equipment you buy today will be years ahead for years to come!

Of course the Motorola equipment you buy today will last longer—that has been proved by hundreds of official records. But just as important to you is the fact that the Motorola equipment you buy today is guaranteed against early obsolescence by the many advanced developments it incorporates—developments that will not be duplicated in other equipment for months—or years. Motorola is able to stay ahead of the field because

it has the largest FM 2-way radio communications laboratory and more qualified radio communications developmental engineers than any other manufacturer in the industry—BAR NONE.

See for yourself how much MORE Motorola gives you. A Motorola Communications Engineer will be glad to call and discuss radio communications as it concerns your specific problems. He'll put you in touch with people in your business who are using Motorola equipment. He'll give you FACTS, not fiction—FIGURES, not fables—WRITE TODAY.

WOOLERY "AJX" WEED BURNER



Burns ALL Weeds fast in ditches and along fence rows. Cleans up yards. Burns frozen ground, pipes, hopper bottom cars, etc. Burns out stumps. Light weight. Easy to handle. Prompt Delivery. Low price.

Write for FREE catalog today.

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Motorola

FM 2-WAY RADIO

Motorola Inc.

Communications Division: 4545 Augusta Blvd., Chicago 51, Ill.
Canadian Distributor: Rogers Majestic Ltd., Toronto - Montreal

fore the snow is packed by traffic. When the snow gets too deep for this type of plow, light trucks with side-delivery plows take over. These stay out until the snow stops or until enough snow has fallen to require heavy trucks with side-delivery plows. After the regular equipment has gone through, the heavy-duty mechanically powered rotary wing plows move in to slice off the high roadside banks.

Besides snow removal, highway workers combat ice conditions that are equally trying. Hills, curves, and intersections must be sanded and other steps taken to clear the road of ice or packed snow after each storm. Sand trucks start operating at these spots to remove the hazards of slippery roads. If a layer of snow glazes over and causes an icy condition, the road gets an application of chemically treated abrasive. As soon as the chemical in the abrasive has loosened the ice, it is peeled off by trucks equipped with scrapers. The control of ice requires that emergency measures be taken as soon as it begins to form.

Costs

Last year, Michigan spent approximately \$3,000,000 to keep its highways clear of snow and ice. In southern Michigan, when normal winter conditions prevail, approximately 75 per cent of winter maintenance money is spent on ice control, the remainder on snow removal. In the central part of the state, the division is on a 50-50 basis; and in the northern portion, 65 per cent goes for snow removal, 10 per cent for snow fence, and 25 per cent for ice control. Last year, however, unusually bad ice conditions made it necessary to spend 51 per cent of the total winter maintenance money on ice control.

"It is the responsibility of the Michigan State Highway Department to maintain roads in the best possible condition consistent with traffic volume," Commissioner Ziegler says, "and although the cost of snow removal in Michigan may seem high to the average person, it must be remembered that the economic welfare and development of our state is dependent on a well maintained and adequate highway system over which raw and finished materials may be moved to and from our factories, and food products from our farms to markets. It must be recognized, too, that any condition which delays the normal flow of traffic also means a loss of gasoline-tax revenue, which is the Highway Department's sole source of income. Therefore, clear highways in winter mean more revenue, and help to pay for snow-removal work done on them.

"An efficient snow-removal program is not only extremely important to the everyday life of our people, but it is also insurance against accidents."

Proceedings of the HRB; Also Bulletin on Finance

Proceedings of its 27th annual meeting have been compiled in book form by the Highway Research Board of the National Research Council. The book is 523 pages long, and presents reports on economics, finance, and administration; design; materials and construction; maintenance; traffic and operations; and soils investigations. It also contains minutes of the business meeting, and lists winners of the Highway Research Board and George S. Bartlett Awards.

The Board has also made available—in a separate bulletin—five papers sponsored by the Committee on Highway Finance. These five papers are: "The Federal-Aid Highway Program", by C. D. Curtiss; "Highway Finance and the Consumer", by Wilfred Owen; "Information Needed for the Fiscal and Allied Phases of Long-Range Highway Program Planning", by C. A. Steele; "Highway Revenue and Expenditure Trends",

by Bertram Lindman; and "Current Long-Range Studies of Highway Modernization Programs", by G. Donald Kennedy.

Copies of these bulletins can be obtained from the HRB's Publication Offices at 2101 Constitution Ave., Washington 25, D. C. Cost of the proceedings volume is \$7.50, cost of Bulletin No. 12, "Highway Finance", is 75 cents.

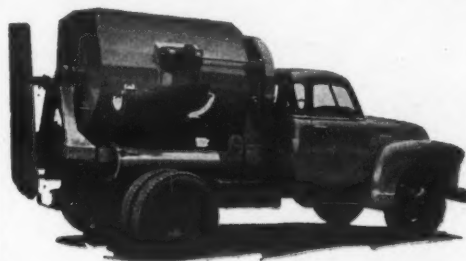
Changes for Gar Wood, Inc.

W. H. Hammond has resigned as Vice President of Sales of Gar Wood Industries, Inc., to take over a distributorship of the company's products. Henceforth, E. B. Hill, General Sales Manager, will assume overall responsibility for sales and distribution.

R. D. Hiller, Jr., has been promoted to the position of South Central Regional Manager with headquarters at Tulsa, Okla. He formerly held the position of District Manager in the southwest. He is succeeded in that position by W. A. Williams.

Check these advantages!

Compare the Features of the High Discharge Transport Truck Mixer:



Write for full details on this durable, efficient mixer.

- ✓ VISIBLE MIXING
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Super Service ON ALL TYPES OF JOBS!

1/2 and 3/4 Yard
EXCAVATORS

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UP TO 15 TONS



Every UNIT is FULLY CONVERTIBLE

Regardless of whether your job calls for a shovel, clamshell, magnet, dragline, trencher, grapple or backfiller, a UNIT machine easily "fills the bill"! For UNIT is convertible to ANY attachment and gives an excellent account of itself on ALL types of service. The change from one attachment to the other can easily and quickly be made on the job by any ordinary mechanic. UNIT exclusive features include Automatic traction brakes... Disc type clutch... One piece steel gear case and above all, UNIT's... FULL VISION CAB.

"You can tell it's a UNIT by
the FULL VISION CAB.
There's no other cab like it."

UNIT CRANE & SHOVEL CORP.

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MILWAUKEE 14, WIS., U.S.A.



SHAFT HEADFRAME. Before going down into the water-supply tunnel which Rosoff, Ltd., is building for the Baltimore Dept. of Public Works, let's mosey about above ground at Druid shaft—one of four which Stearns Construction Co. of St. Louis sank for the job. From its 80-foot headframe is suspended a platform cage with counterbalance, operated on a 2-part line by a mine-type hoist. Halfway up is the hopper bin where rock is discharged to trucks.



HOIST HOUSE. The hoist house at Druid shaft is a McKiernan-Terry 48-inch-diameter drum driven by a General Electric 150-hp motor operated on a 1-inch steel cable. Constant communication is maintained between the house, the shaft, and the tunnel itself, by means of Teletalk units.

IN CHARGE. Hosts on our inspection tour of the Baltimore, Md., water-supply tunnel are (left to right) A. T. Araneo, Field Engineer for contractor Samuel R. Rosoff, Ltd., of New York City; Bernard L. Werner, Resident Engineer on the project for the Baltimore Bureau of Water Supply; and M. L. MacLean, Chief Engineer, and P. S. Miller, Resident Engineer, for Rosoff.



(Baltimore Bureau of Water Supply, John F. Peacock, and C. & E. M. Photos)

Water-Supply Bored Through

Working Six Faces From
Contractor Blasts Mile
Of 10 and 7-Foot-Diameter
To Increase Baltimore Water

(See article on page 5)



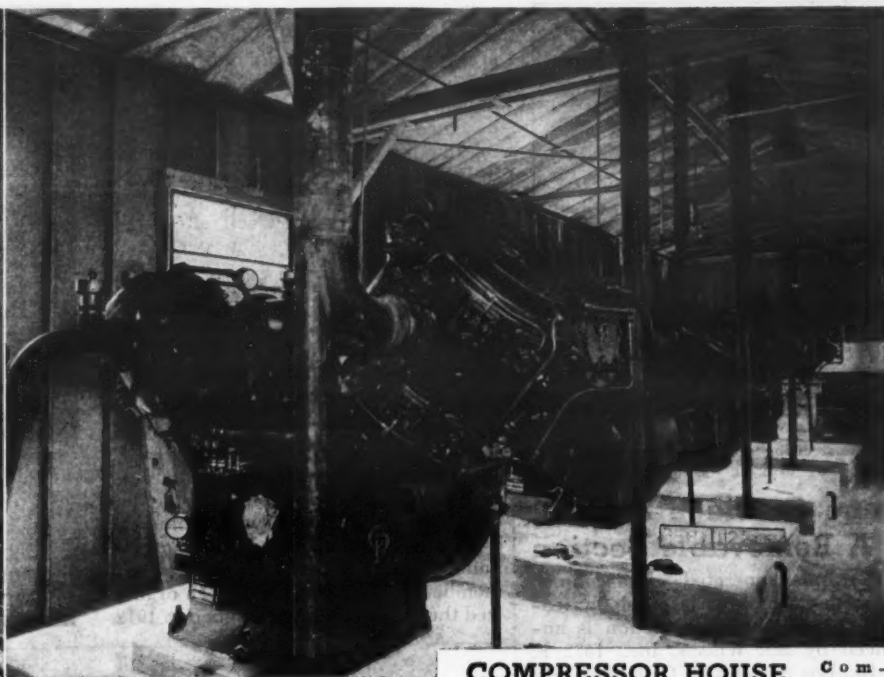
DRILL 'JUMBO. Now for a quick tour below ground in the Stony Run and Montebello tunnel sections—starting with this look at the drill jumbo working on a 9-foot 4-inch cut from the Montebello shaft. Five Chicago Pneumatic 3½-inch drifter drills mounted on pipe pedestals are grouped on the steel jumbo, which moves over the tracks on four wheels. At the back of the carriage are connections for compressed-air and water lines.



MUCKER. After a blast we see an Elmco Model 40 pneumatic mucker move forward on the tracks. It scoops up the rock in its ¼-yard bucket and throws it back into a ¼-yard muck car at the rear. From there the rock moves backward on a conveyor belt and is discharged into the muck pile at the mucker drawbar. The mucker can keep on working even if no car is behind, since the muck can be loaded by hand.



BATTERY-CHARGING SHOP. From the top of the shaft a track runs over to the battery-charging shop. Here the Greensburg electric locomotives which handle muck cars in the tunnel are brought about once every shift to have their Exide batteries recharged. Right now, as we watch, a CM Meteor 3-ton electric hoist, riding on an overhead beam track, lifts a battery out of a locomotive to replace it with a charged one.



COMPRESSOR HOUSE. Compressed air for the drills used in boring the tunnel at the Druid shaft is supplied by four Chicago Pneumatic compressors powered by G-E synchronous motors and installed in a metal compressor house. Total capacity of the four units is 2,540 cfm. The compressed air is cooled, then piped to the two tunnel headings which are being worked from the Druid shaft.

py Tunnel g Solid Rock

s For Four Shafts,
sts Mile Tunnel
-Diameter Sections
more Water Supply



DRILL SHOP. Last call above ground is the Quonset hut which houses the blacksmith shop—the place where drill steel is forged and resharpened. Here Radiac cut-off machines cut Bethlehem drill steel to required sizes. The steel is heated in Gardner-Denver oil-burning furnaces, and the bits are fashioned and resharpened in Gardner-Denver forges.



CAR PASSER. When a muck car is filled, it is pulled back about 250 feet from the heading by a locomotive and sidetracked on a car passer—a short section of track at right angles to the regular 24-inch-gage track—so that other cars can pass. Then the loaded car is returned to the main track. When the loaded cars are all behind the car passer, they are towed to the hoist, raised to the hopper bin in the headframe, and dumped. Trucks haul the rock away.



TUNNEL BRACING. As the mucking advances, the few portions of tunnel where rock is loose and shaky are supported by steel I-beam ribs on 4-foot centers, bolted together at the top and longitudinally with steel rods. They are assembled from the drill carriage. The excavation part of the \$9,137,200 Rosoff contract is scheduled for completion by the end of this year. Concrete tunnel lining should be in near the close of 1949.



A removable rear section of frame on the Maxi crane carriage permits close-up digging operations.

Crane Carriage Has A Removable Section

A one-man-operated close-coupled three-axle crane carriage which features a removable rear section is announced by Six Wheels, Inc., 1572 E. 20th St., Los Angeles 11, Calif. The new Maxi carriage is a rubber-tired rig for use with any make of crane or shovel which has a lifting capacity of 5 to 30 tons, or a shovel capacity of $\frac{3}{4}$ to $1\frac{1}{2}$ cubic yards. The removable rear section of the frame is designed to permit close-up digging operations.

The company's Model CC short-wheelbase crane carriages have a special drawbar arrangement which permits towing the crane long distances at high speeds. They will, however, travel under their own power at speeds up to 15 mph in either direction. All operations, including steering, braking, and transmission shifting, are controlled from the operator's position in the crane cab. Each axle is equipped with dual wheels so that the crane is mounted on a total of 12 tires.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 46.

Impact Hammermill

An impact-principle hammermill is manufactured by the Rogers Iron Works Co., 3913 Charles Block, Joplin, Mo. It is recommended by the company for crushing, grinding, pulverizing, or shredding operations, and is manufactured in four sizes—30 x 18, 30 x 24, 30 x 30, and 30 x 36 inches. According to the manufacturer, the Rogers mill is not of the slugger type, and material must be prepared by a jaw crusher before it is fed to the hammermill. The manufacturer also recommends the use of a surge hopper between the primary crusher and pulverizer.

The hammers are reversible and are made from a manganese steel; outside disks are constructed of cast steel. Intermediate disks are constructed of heavy steel plates with steel spacers. The rotor-disk assembly is equipped with four rows of hammers, with the number of hammers dependent on the width of the mill. The grates are of manganese steel, and so is the adjustable breaker plate.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 50.

Breaker Is Truck-Mounted

An 8-page folder describing the features and operation of the Novo pavement breaker has been put out by the Novo Engine Co., 702 Porter St., Lansing, Mich. Novo recommends these breakers also for trimming concrete and asphalt pavements, and for cutting various types of pavements for trenches, water lines, sewer lines, or cables.

Folder No. 221 includes three detailed illustrations of the unit—a view from the drive side, a view from the rear, and a view of the unit mounted on a truck with a short wheelbase. Specifi-

cations cover the engine, drive, hoist, frame, cable, hammer, and weight. General installation information is included, and a large drawing which shows the dimensions of the Novo breaker is also designed to serve as a guide for mounting the unit. General information listed in Bulletin 221 includes operating costs, type of work and thickness of pavement on which the breaker will effectively operate, and typical jobs performed with the unit.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 6.

Safety Leader Dies at 64

Eugene Pettibone, Vice President and Manager of the Engineering Department of the American Mutual Liability Insurance Co., died recently at the age of 64. Mr. Pettibone was intimately associated with many activities of the national safety movement, and was a member of the committee which organized the National Safety Council in 1912.

"Decal" Identification

A rapid and uniform means of identifying or marking equipment is by the use of decalcomanias. One manufacturer of this type of material is Superior Decals, Inc., Ft. Worth Ave. at West-mount, Dallas 11, Texas.

The company points out that Super-Cals are made entirely of du Pont Dulux synthetic enamel, 0.004 inch thick. It states that this extra thickness allows for ease of handling and reduces waste at the time of application.

Reproduced from CONTRACTORS AND ENGINEERS MONTHLY

Superior



Decals, Inc.

FULL INFORMATION
WITHOUT OBLIGATION

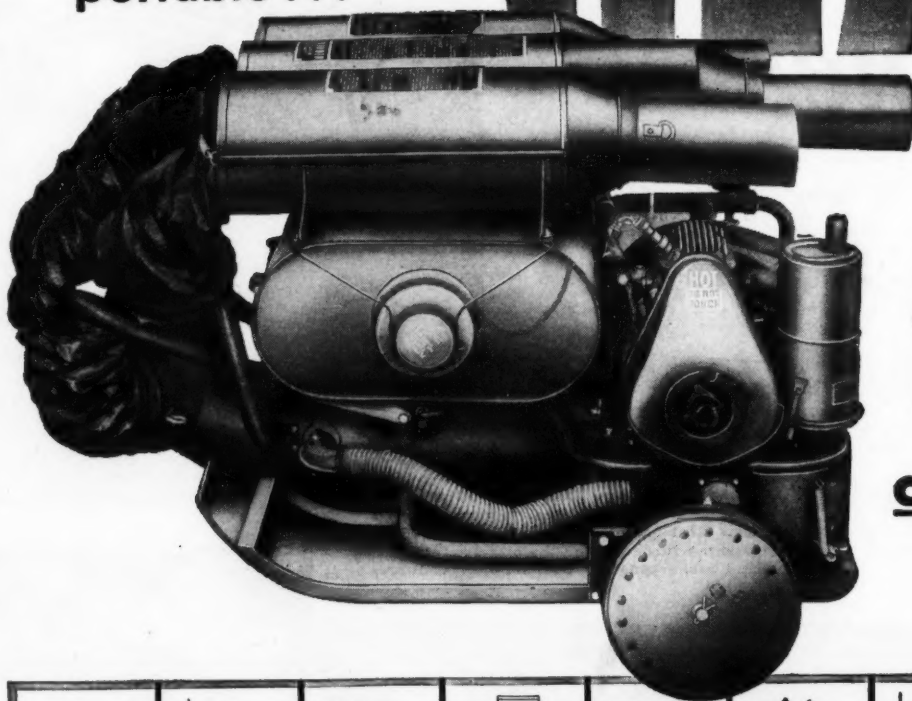
2827 FORT WORTH AVENUE DALLAS 11, TEXAS

For the Finest
in Decals... Get
SUPER-CALS

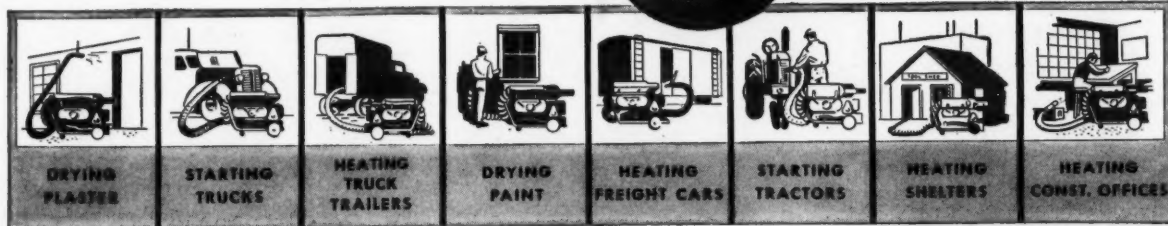
- ✓ Easier to Apply
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Let us send you the complete story of how you save money... and mark your equipment more attractively... with SUPER-CALS. Compare SUPER-CAL quality... you will appreciate the extra value.

Here's cheap
plentiful...
portable...



For
**1001
USES**
in
**Construction
Work!**



Anyone in the construction business needs this remarkable heater for winter work. Used with tarpaulins, it keeps bricklayers and other workmen on the job in toughest sub-zero weather. Heats sheds, shelters, storage buildings, job offices. Gets trucks, tractors, and machines of all kinds going quick on cold mornings. Wherever you want heat in a hurry, and at low cost, just wheel this heater to the spot, pull the starter cord (like an outboard motor) and pour on torrents of heat through three flexible ducts. Many hundreds sold last year to contractors everywhere. This is a war surplus heater, made by Stewart-Warner, used by Army and Navy in the Arctic to start planes and tractors, heat plane interiors, quonset huts, etc. Each heater fully reconditioned, guaranteed in tip-top operating condition. Cost U.S. government about \$600. Limited quantity available at amazing price of \$195. SPECIAL: 5% discount in lots of 10 or more. Use order form at right.

ALSO AVAILABLE—BRAND NEW HEATERS—\$295.00
5% discount lots of 10 or more. Special discount to dealers.

- 3 ducts, one is 16' long, two are 10' long
- 100,000 BTU's per hour
- Weighs 250 lbs.
- $1\frac{1}{2}$ horsepower
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\$195.00
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Minneapolis,
Minnesota

MAIL THIS ORDER FORM FOR IMMEDIATE DELIVERY

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Dept. G

Please ship by fast freight or express, f.o.b. Minneapolis, reconditioned heaters at \$195; brand new heaters at \$295. Check () or money order () attached.

Name _____
Address _____
City _____ Zone _____ State _____

ENNIS SUPPLY COMPANY
Minneapolis 1, Minnesota, U.S.A.

Black-Top Mix Laid On Concrete Highway

Contract Included 2-Foot Widening on Each Side of Gravel and Penetration Macadam a Foot Thick

A 9½-MILE stretch of State Route 7 east of Binghamton, N. Y., in the south-central part of New York State was improved last year by District 9 of the New York State Department of Public Works. Beginning at Port Crane, the reconstruction runs eastward through Sanitaria Springs to Harpursville. It lies wholly within Broome County. The old road consisted for the most part of a 20-foot-wide 8-inch-thick reinforced-concrete pavement from 18 to 20 years old. A short section of 1½ miles near Sanitaria Springs was only 18 feet wide.

A contract to widen this highway to 24 feet, and surface it with asphaltic concrete, was awarded to the Binghamton Construction Co. of Binghamton, N. Y., on its low bid of \$209,931 to the New York State Department of Public Works. The job started on July 1, 1947, and was completed by the end of November the same year.

At the narrow section around Sanitaria Springs the pavement was widened 3 feet on each side. But over the rest of the project a 2-foot widening strip along each edge of the concrete was sufficient. The widening was a foot thick, and consisted of 9 inches of run-of-bank gravel as a foundation course, topped by 3 inches of crushed stone which was given a penetration-macadam treatment. The full 24-foot width was then covered with two courses of hot plant-mix to a total thickness of 2½ inches.

Road Widening

In order to dig the widening trench along the pavement, the contractor used a Caterpillar No. 18 ripper pulled by a D8 tractor to loosen the hard-packed dirt shoulders. After two passes with the ripper prongs, the compacted hardpan was well broken up. A drop blade, 14 inches deep x 30 inches wide, was then attached to a Rome motor grader at such an angle that it cut a 2-foot-wide trench, throwing the excavated material off to the side. The bottom of the trench was next rolled by a Buffalo-Springfield 4 to 5-ton trench roller, so that the depth of trench would be a full 12 inches below the top of the adjoining concrete.

A 9-inch foundation course, specified to be laid in two 4½-inch courses, was put in the bottom of the trench. The bank-run gravel was dug out of a pit near Port Crane by a Bucyrus-Erie ½-yard shovel and loaded into a fleet of 8 White trucks holding from 6 to 7 cubic yards each. The trucks hauled the gravel an average distance of 5 miles to the section being widened. There the material was dumped into the receiving hopper of an Apsco No. 40 spreader. This machine laid the first course of gravel which was then compacted by the trench roller to a depth of 4½ inches.

Instead of putting in another 4½-inch course to complete the 9-inch required depth of gravel, the spreader filled the trench on the next pass up to the top of the adjoining slab. The trench was then rolled by a Buffalo-Springfield 12-ton 3-wheel roller. With the above equipment an average of one mile of trench was dug and filled with gravel in a 10-hour day.

Penetration-Macadam Top

The grader with the drop blade next skimmed over the widening trench, cutting out the top 3 inches of gravel to make room for the same depth of penetration-macadam top. This method of filling the trench first and then cutting out the upper 3 inches was found

(Continued on next page)



C. & E. M. Photo

Here a truck dumps hot-mix into an Adnan Black Top Paver on the 9½-mile reconstruction job on New York Route 7 in the south-central part of the state. The paver laid the material over the widened concrete pavement in 12-foot lanes.

Cummins Diesels Save Fuel

Compare the cost! Operate a Cummins Diesel
alongside other engines—diesel, gasoline,
or butane—then check your fuel bills.
Here's what our customers report:



Annual Savings:
\$2620⁰⁰

Yearly fuel costs for a Cummins-powered truck used on an off-highway haul, consisting of three 22-mile round trips per day, are \$2620.00 less than the fuel costs for a gasoline-powered truck used on the same haul. That's because the Cummins-powered truck shows a daily fuel cost of \$3.47 against \$13.55 per day for the gas job.

Annual Savings:
\$1138⁸⁰

Yearly fuel costs for a Cummins-powered earth mover on a multi-million-yard earth-moving project are \$1138.80 less than the fuel costs for an earth mover powered by another make of diesel and doing similar work. That's because the Cummins-powered unit, while making more trips and carrying heavier loads, uses only 25.7 gallons of fuel per shift against 33.5 gallons per shift for the other diesel.

For
Over 70 Years
Builders of Fine
WHEEL BARROWS:
AMERICAN
STEEL SCRAPER CO.
Sidney, Ohio

Black-Top Mix Laid On Concrete Highway

(Continued from preceding page)

to be faster in the long run, than if only the 9 inches of gravel had been put in at the beginning. It also resulted in obtaining a more exact 3-inch depth for the crushed stone.

No. 3 stone, graded from 2-inch down to No. 4 size, was used for this upper course. It was purchased from the Janesville, N. Y., quarry of the Solvay Process Co., and shipped in hopper-bottom cars 80 miles to a siding of the Delaware & Hudson Railroad at Sanitaria Springs. There it was unloaded by a Barber-Greene 20-foot conveyor directly into trucks. They in turn discharged their contents into the Apsco spreader which laid the stone to a 3-inch thickness. The course was rolled by the 12-ton 3-wheel roller.

The stone was then given a shot of asphalt, penetration 85 to 100, applied at the rate of a gallon to the square yard at a temperature of 300 degrees F. The bitumen was shipped in tank cars from the Socony Vacuum Oil Co. at Bayonne, N. J., to the contractor's plant and headquarters in Binghamton. There it was transferred to an Etnyre 1,250-gallon distributor mounted on a Brockway truck which applied it to the top widening stone.

In the meantime piles of stone chips, also purchased from Solvay, had been spotted along the shoulders of the road. These chips were then cast over the asphalt-coated larger stones to fill in the voids; the spreading was done by hand with shovels. The big roller made a pass over the stone to help bind the materials together still more.

The old pavement in previous years had been given bituminous surface treatments to cover the cracked, uneven, and broken-up surface of the concrete. In some places large bituminous patches had also been put down. Where this mat was loose and easily removed, it was scraped from the pavement by a couple of other motor graders—an Adams and a Galion. The full 24-foot width was then swept clean by a Hough power broom pulled by a Fordson rubber-tired tractor.

Black-Top Surface

The 2½-inch surface of asphaltic concrete was put down in two courses—a base or binder course of 1½ inches and a top course an inch thick. The material was mixed according to the patented Steamix steam-dispersion process at the contractor's permanent asphalt plant in the city of Binghamton. The Binghamton Construction Co. has two asphalt plants—a Cummer 2-ton and a Simplicity ¾-ton—which turn out bituminous mixes for commercial use.

For this highway surfacing plant-mix, the contractor used Solvay crushed stone, Socony Vacuum asphalt, and sand from two local Binghamton sources—Barney & Dickinson, Inc., and the Binghamton Crushed Stone & Gravel Co. The gradation of material in the binder and top courses was as follows:

Sieve Sizes	Volume by Weight in Per Cent		
	Passing	Retained	
		Binder Course	Top Course
.....	1-inch	0-5	0-5
1-inch	¾-inch	35-60	15-40
¾-inch	½-inch	20-40	25-45
½-inch	¼-inch	5-20	15-45
¼-inch	No. 80	5-15	15-45
No. 80	.....	0-5	0-12
Asphalt, pen.	100-120	3-5	5½-7

From the plant in Binghamton the hot-mix was hauled an average distance of 13 miles to the job. Trucking was done by Howard & Sprague of Binghamton and was paid for by the ton-mile haul. The average number of trucks in use was ten, including Fords, Internationals, and Whites, carrying 6, 8, and 10 tons respectively. The mix was laid at temperatures ranging from 225 to 275 degrees F, and the contents of the

trucks were covered with tarpaulins so as to retain the heat.

Paving Operations

The trucks discharged their loads into an Adnun Black Top Paver which laid the hot-mix in 12-foot lanes at the rate of 180 pounds to the square yard for the bottom or binder course, and 100 pounds for the top course. On the bottom-course work the paver operator held his machine on line simply by following the center line of the old road. For the top course, however, pins were driven on 50-foot centers into the shoulder of the road at a distance of an inch off the edge of the widening. On curves the pins were set at 25-foot intervals. A string was stretched between the pins for the paver operator to follow, thus keeping the machine true to the exact alignment.

The usual procedure was to have the paver work along one 12-foot lane for about 700 to 800 feet, and then go back and pave the other half of the road for that distance, bringing both lanes up even together. Rolling on both bottom and top courses was done first by a 12-ton 3-wheel roller, then by an 8-ton tandem roller; both were Buffalo-Springfields. Traffic was maintained on the highway during all the construction operations, and was permitted on the new surface as soon as it was rolled thoroughly. Water for the paver and rollers was pumped from creeks along the job by a Jaeger 2-inch pump into four 50-gallon drums. The pump and drums were transported on a Dodge service truck.

The paving crew numbered 15. It was made up of a foreman, paver operator, 2 roller operators, 2 rakers, 2 flagmen,

and 7 laborers. Rakes and shovels were kept clean by dipping them in a can of fuel oil which was carried along on the paver. The paver rolls were cleaned occasionally by spraying them with water, so that they would not pick up

particles of the hot-mix. A wheelbarrow was also part of the paving crew's equipment. Hot-mix was carried back in the wheelbarrow and spread lightly over the course with hand shovels if a
(Concluded on next page)

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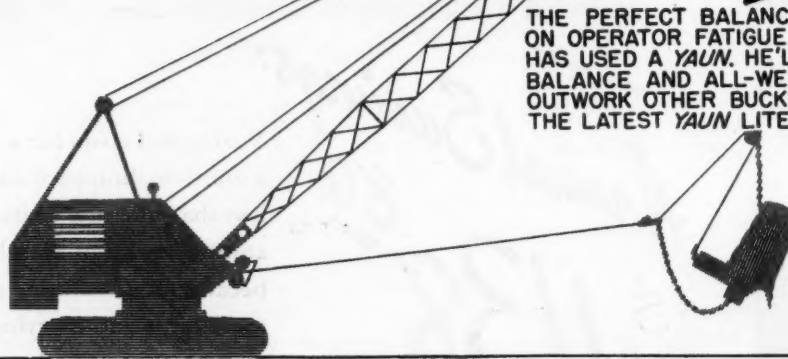
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YAUN DRAGLINE BUCKETS AND MFG. PLANT
BATON ROUGE, LA.

thin or open area was observed in the material already laid.

When the paver was working on the top course, a shoveler followed along the edge of the road behind it, pushing the shoulder dirt up against the fresh plant-mix. This gave support to the edge, and checked any breaking off or raveling under the action of the rollers.

Production

Working a 10-hour day and using only the single paver, the contractor turned out as much as 3,000 feet of full-width base course on one day, and 3,544 feet of full-width top course on another day. For the 3,000 feet of base course he used 720 tons of binder; for the 3,544 feet of top course he used 475 tons. The average daily production was around 600 tons, or enough for about ½ mile of base course and slightly more of top course.

Another crew of 12, including foreman, grader operator, and 10 laborers, followed behind the last of the paving operations to construct the shoulders. The material excavated from the widening trench, together with the excess gravel, built these shoulders up to an average width of 6 feet.

Quantities and Personnel

The major items of the contract included the following:

Unclassified excavation	12,000 cu. yds.
Foundation-course gravel	5,800 cu. yds.
Stone, bituminous-macadam penetration	1,900 cu. yds.
Asphaltic concrete	18,900 tons
Asphalt for penetration	34,000 gals.

The Binghamton Construction Co. was represented on the project by Edmund P. Smith, Superintendent, with James Tangi as Paving Foreman.

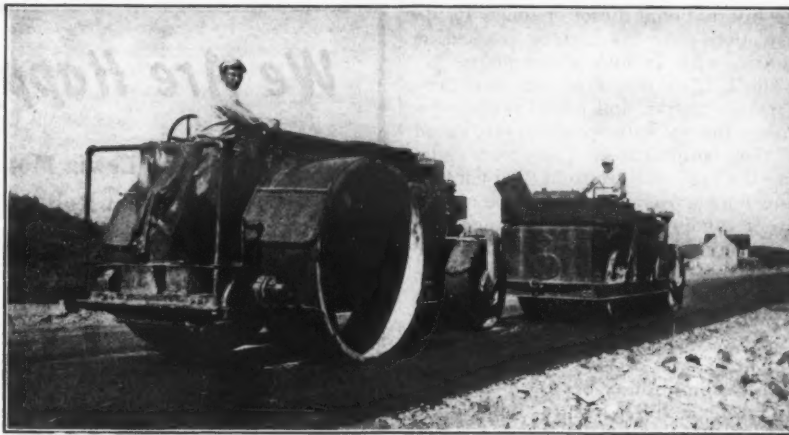
For the New York State Department of Public Works, Bobby Sullivan was Resident Engineer. The project was located in the Ninth District which is headed by F. W. Donovan, District Engineer with headquarters at Binghamton. B. D. Tallamy is Superintendent of the Department of Public Works with headquarters at Albany, and J. B. McMarran is Chief Engineer.

Lightweight Welder; Four New Electrodes

A lightweight dc welder and four new electrodes have been announced by the Welding Equipment Division of the General Electric Co., Schenectady 5, N. Y. The welder is powered by a Wisconsin VF-4 air-cooled gasoline engine, speed-ratio-coupled by a steel-core V-belt drive to a G-E Type WD-3200 generator with a duty cycle of 50 per cent. The unit is rated at a maximum of 250 amps of welding current. It weighs 660 pounds.

A fully calibrated dual control permits any desired welding current to be set before the arc is struck, G-E explains. Overall length of the unit is 44½ inches, width 24½ inches, and height 35½ inches. The welder can be furnished mounted on a 2-wheel pneumatic-tire trailer with a standard 62-inch track. It has a built-in auxiliary power outlet of 110 volts for the operation of lights and power tools.

The Type W-60 electrode has a low-hydrogen coating and manganese-moly analysis. It is designed to weld most hardenable steels where hazards of



C. & E. M. Photo

Two Buffalo-Springfield rollers compact the top course of hot-mix on the Binghamton Construction Co. job—a 12-ton 3-wheel unit, followed by an 8-ton tandem.

under-bead cracking are to be eliminated. These include low-alloy, high-sulphur, high-carbon, high-manganese, and similar high-hardenable and high-tensile steels.

Type W-61 is a low-hydrogen electrode of a moly-vanadium composition and can be used with either ac or reverse-polarity dc to weld low-alloy steels. Type W-62 is a low-hydrogen

titania-coated electrode with a nickel composition of 2½ per cent. It can be used on steel castings of similar analysis and for producing weld deposits with high resistance to impact; at sub-zero temperatures. The Type W-95 is designed to deposit extremely hard wear-resisting weld metal in all positions, using ac or dc. It is suitable, the manufacturer states, for surfacing dipper teeth, dragline bucket lifts, tractor cleats, roller-crusher teeth, mud pumps, impeller crane hooks, sand pumps, and sizing screens.

Further information may be secured from the company, or by using the enclosed Request Card. For information on the welder, Circle No. 61; for the electrodes, No. 62.

Bergman Upped by Joy Co.

The appointment of a District Sales Manager for the Knoxville, Ky., territory is announced by the Joy Mfg. Co. He is George W. Bergman, formerly Assistant Manager in that area.

How to cut AGGREGATE PRODUCTION COSTS...

This 20 page bulletin will show you a dozen ways to cut the cost of producing crushed stone, crushed gravel, roadstone, washed gravel or stone. It gives detailed descriptions and specifications on the four basic units that make up Unitized Plants, describes how each portable unit, complete in itself, can be used in any combination depending on pit or quarry conditions and the finished product desired. Send for your free copy today!

A few thousand yards... or several hundred thousand? Whatever your production requirements, you can produce aggregate *more profitably* with Cedarapids Unitized Plants. Crushing, sizing, washing done in one smooth, balanced operation that means higher output at lower costs per ton. Six different sizes of finished products in one operation! Capacities from 25 to 250 tons per hour! Instantly adaptable to special job conditions from rip rap to agstone, any quantity, any specifications... time and labor saving flexibility... fast, easy set-up and takedowns... low operating costs, minimum maintenance and repairs... THAT'S CEDARAPIDS flexibility, mobility and volume production combined in one all-purpose, cost-reducing package.

Keep the good contracts coming in. Finish them on time... at a profit. When buying a crushing plant... buy the best... buy Cedarapids.

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Classified Advertising Dept.

Contractors & Engineers Monthly

470 Fourth Ave., New York 16, N. Y.



Vertical design cuts down on the floor space required by this Grimes garage compressor. It comes in three models with 20 or 30-gallon tanks and displacements of 1½, 2.7, and 4.07 cfm.

Vertical Compressor

A garage air compressor which features a vertical design in order to cut down on the required amount of floor space is built by The Grimes Co. of Dallas, Texas. This unit has an upright tank with the motor and air-compressing unit mounted on the top. It is manufactured in three models: the 25-V which has a 20-gallon tank and a 1½-cfm displacement; the 50-V with a 30-gallon tank and a displacement of 2.7-cfm; and the Model 75-V with a 30-gallon tank and a 4.07-cfm displacement.

According to the manufacturer, the Model 25-V takes up a floor space 20 inches in diameter, and the 50-V and 75-V take up a space 24 inches in diameter. All three units are equipped with single-phase 110 or 220-volt motors. The 25-V has a ¼-hp motor; the 50-V, a ½-hp motor; and the 75-V, a ¾-hp motor. All three units are said to have withstood hydrostatic pressures of 400 pounds. Working pressure is rated at 200 pounds. Each machine comes complete with an automatic pop-off valve and adjustable automatic switch.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 11.

Body for Hauling Concrete

An illustrated pamphlet on the Dumperete body for hauling concrete without agitation is available from the Dumperete Division of Maxon Construction Co., Inc., 131 Ludlow St., Dayton 2, Ohio. Bulletin No. L-102 features action photographs of the Dumperete body in use on various types of projects.

The folder shows how the Dumperete can be used for slow pours into wheelbarrows; for fast pours directly onto floor slabs; for form work, using the adjustable chute and high discharge; and for controlled discharge regulated by the positive cut-off gate. The pamphlet also describes the various features claimed for the unit, including a low center of gravity, adjustable baffles, 90-degree dumping angle, sectional folding chute, and water-tight body.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 105.

Diesel-Engine Power Units

Diesel-engine power units are described in a new catalog prepared by the International Harvester Co., 180 N. Michigan Ave., Chicago, Ill. Catalog No. A-54-LL covers the design features, specifications, and work capacities of

the International diesel engines. Its illustrations show the engines stripped, as well as with various attachments.

The catalog contains complete performance charts, and tables reveal at a glance the various specifications listed by the manufacturer. The charts indicate the peak, intermittent, and continuous horsepower ratings; torque at different engine speeds; and average fuel consumption with wide-open throttle under intermittent load. A "work-it-will-do" table accompanies each engine and lists its capacities in operating rock crushers, generators, hoists, sawmills, and pumps.

The bulletin describes the I-H starting system, full-pressure lubrication, and precision fuel metering and injection. It also shows, in a step-by-step picture sequence, the building up of a basic engine into a complete power plant. Specifications and dimensions are included for each of the units.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 77.

We Are Happy To Announce

The merger of Lewis Manufacturing Co., manufacturer of Pierce Bear Tandem Rollers, with the Browning Manufacturing Co., manufacturer of BMCO Pneumatic Tired and Sheeps Foot Rollers.

See your Dealer or contact us for full information on our complete line of compaction rollers.

A few territories are open to dealers under this new arrangement and we will welcome inquiries.

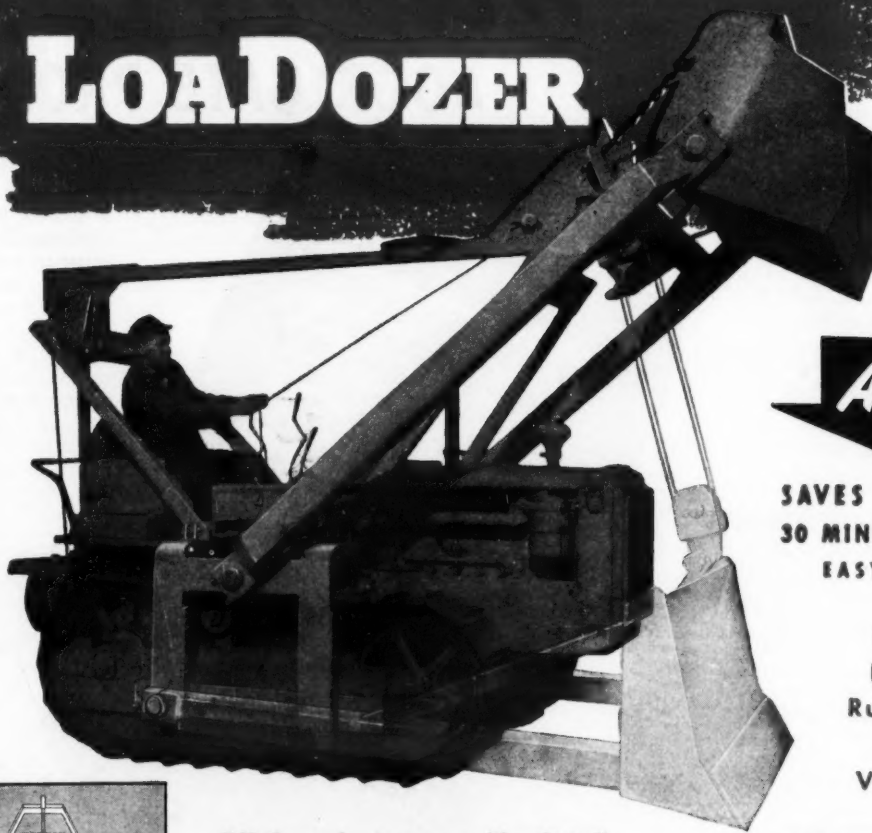
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30 MINUTE CHANGE-OVER
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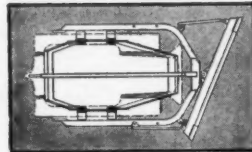
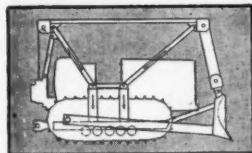
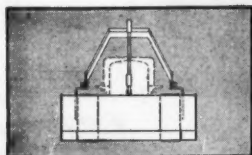
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Economy
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All these features are "built-in" qualities of the new SOUTHWEST "LOADOZER"—Extra

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- Built for all four makes of track type tractors.
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- For complete specifications on this Loader-Bulldozer combination unit—WRITE FOR BULLETIN CM-11.



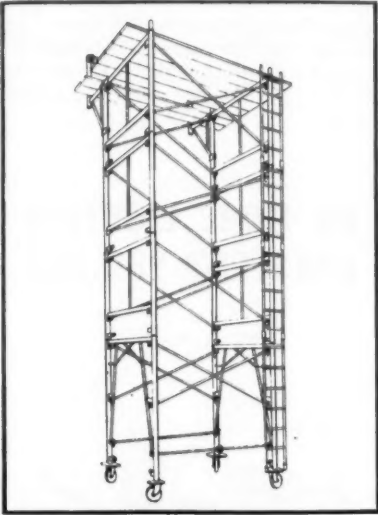
"Over Center Track Mounted" design gives perfect balance

CONSTRUCTION MACHINERY DIVISION

Southwest Welding & Manufacturing Co.

ALHAMBRA, CALIFORNIA





The Advance knock-down type of tubular steel scaffold is designed to eliminate wing nuts, bolts, or toggle pins. It has only fifteen parts in all.

Tubular Scaffolding

A knock-down type of scaffold is announced by the Advance Scaffold Division of the Beaver Art Metal Corp., Box 792, Ellwood City, Pa. Made from tubular steel, the Advance scaffold is designed to eliminate the need for wing nuts, bolts, or toggle pins. It is engineered for a load of 50 psf, on 7-foot spans, at a height of 125 feet, and with a safety factor of 4.

The frames are doubled-welded at the girt joints. The joining cross-braces feature the use of a cam lock designed for fast and positive assembly and breakdown. The manufacturer says that the complete scaffold uses only fifteen different parts in all.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 15.

Post-Hole Diggers

A post-hole digger for holes 6 or 9 inches in diameter and up to 46 inches in depth is manufactured by Standard Steel Works, 16th and Howell Sts., N. Kansas City, Mo. The Easy-Way digger is driven from a power take-off and can be mounted on a tractor or jeep. It is designed to dig vertical holes regardless of the position of the carrying vehicle; or it can drill holes at angles of up to 35 degrees.

A torque bar is said to eliminate all twists and binds caused by heavy digging, and to add strength and rigidity to the entire machine. The bayonet-type of point on the heat-treated removable auger bit is designed for fast penetration. And a shear pin on the auger shaft prevents damage to gears in emergencies, the manufacturer points out.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 58.

Timber-Joint Connectors

A bulletin designed to illustrate the advantages of split-ring connectors in timber construction is being distributed by the Timber Engineering Co., 1319 Eighteenth St. N. W., Washington 6, D. C. Among the features claimed for the Teco connectors are simple fabri-

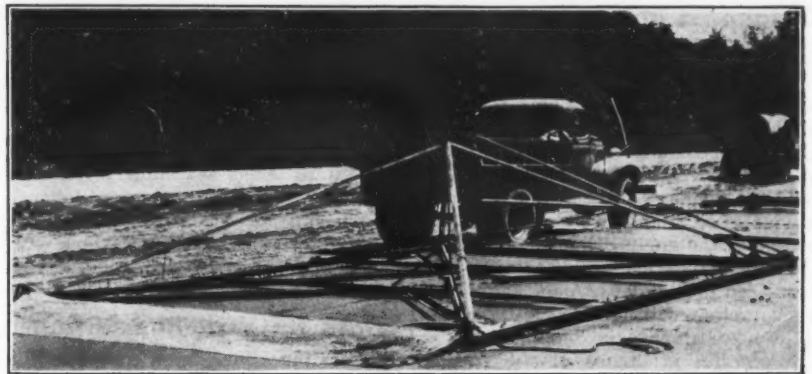
cation, easy assembly, and reduced costs and quantities of hardware and timber.

The booklet describes the assembly of a tension splice designed for a 22,500-pound load. It shows the assembly using Teco connectors, and compares this with other types of constructions as to cost.

Copies of this bulletin entitled "The Best Timber Joints" may be obtained from the company. Or use the enclosed Request Card. Circle No. 19.

Slab Hand Finishing Handled by New Rig

A rig for handling the smoothing and finishing operations usually done by workmen on freshly laid concrete road surfaces has been developed by an engineer-inspector of the Virginia Department of Highways. He is Rayford R. Dawson, and he has named his device the Dawson concrete smoother. It consists of a 13 x 20-foot framework which



The framework which this truck is dragging over freshly laid concrete on a Virginia highway is a concrete smoother developed by Rayford R. Dawson, an engineer-inspector of the Virginia Department of Highways.

is dragged along the pavement by a truck operating alongside. Mr. Dawson expects to build a model on a motorized frame in order to eliminate the need for a truck.

A series of rubberized beltings on the framework are designed to strike the fresh concrete to the right grade, and

at the same time to remove excess laitance and bleeding. Burlap sacking on the rear of the device applies the pavement finish. Mr. Dawson points out that this rig does not eliminate any existing operations, but he feels that it leaves a better finished pavement surface.

DUO-WAY SCOOP



3000 lbs. down pressure normally applied to the 84" dozer blade. Ballast in scoop bucket gives still greater traction.



Fast, easy loading with DUO-WAY SCOOP. Forward tilt of track prevents spillage. Plenty of height and control for side or end loading.



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More power available without damaging equipment. A smooth, easy-operating variable speed transmission.

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Multi-purpose and power-packed, the WAGNERMOBILE DUO-WAY SCOOP can perform a multitude of tough jobs. Driver sits cross-ways in an enclosed cab with intimate control of both dozer blade and scoop bucket.

Outstanding features: Power steering, hydraulic controls, track tilts forward and back, track top section folds without loss of control of scoop, planetary drive.

Ask your nearest MIXERMOBILE dealer for a demonstration.

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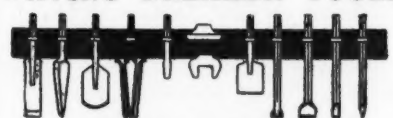
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12 LIME STREET ROCKLAND, MAINE

Oklahoma Moves to Avert Acute Draftsmen Shortage

The shortage of draftsmen in highway engineering departments is being attacked from a new angle by the Oklahoma State Highway Department. Highway Director H. E. Bailey has announced plans to recruit high-school graduates to attend an 8-week drafting course at the engineering school of the Oklahoma A&M college. Trainees will be placed on the department payroll at a salary that will provide for their requirements during the school term.

Successful graduates of the course will then be taken into permanent employment at the Oklahoma City headquarters at an increase in pay.

The State is confronted with record-breaking highway improvement projects for several years to come, and is sorely handicapped by shortages of engineering assistants.

The department has also arranged for special training courses in soil mechanics at A&M for state inspectors, field men, resident engineers, laboratory technicians, and design engineers. Other 2-week courses will deal with asphalt and concrete inspection.

Data on Wire-Rope Slings

Wire-rope slings and a complete line of wire-rope fittings are described in a 72-page catalog distributed by John A. Roebling's Sons Co., 640 S. Broad St.,

Trenton 2, N. J. Catalog A-900 covers the three principal styles in which the Roebling slings are furnished, the classes of loads to which wire-rope slings are subjected, and the design characteristics of slings. It also tells how to select the proper style and size of sling for a specific job.

Wire-rope, grommet, and Flatweave are the types of slings listed in this catalog. They are made in a wide range of styles including cradle, bridle, choker, beam and spliced-loop. They are made with single or multiple parts, and in a variety of lengths and diameters.

Among the fittings listed are thimbles, chokers, sockets, clips, clamps, hooks, swaged fittings, and special-purpose fittings. The booklet also contains in-

formation on how to order wire rope and wire-rope fittings.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 124.

A BOTTOM-DUMP EUCLID

13 cu. yds. struck



With all the job-proved features of Bottom-Dump "EUCS"

plus AIR BOOSTER STEERING!

plus NEW IMPROVED SEAT!

plus LARGER TIRES!

plus NEW HOPPER DESIGN!

These new Euclid features provide better traction and flotation, easier handling, more driver comfort and quicker shedding of sticky materials.

AIR BOOSTER STEERING — Euclid air booster steer reduces driver effort on turns and tough hauls...retains feel of the road...gives better control on soft fills.

NEW IMPROVED SEAT — A form fitting bucket type driver's seat has compression spring and rebound hydraulic shock absorber...built for long life in heavy service...provides a comfortable ride even on the roughest hauls. Adjustable for driver's weight and position.

LARGER TIRES — Better traction and flotation are obtained with 24.00 x 25 low pressure tires. Tapered bead seat on tire rim provides better gripping action between tire and rim.

NEW HOPPER DESIGN — Steeper hopper sides assure clean, fast shedding of sticky materials. Improved design of the wedge shaped hopper places more payload weight on drive tires for better traction.

See or write your Euclid distributor for complete information on this new Model FDT-89W Bottom-Dump EUCLID.

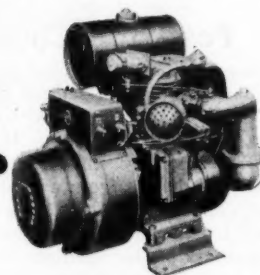
The EUCLID ROAD MACHINERY Co., Cleveland 17, Ohio

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On small and medium size jobs I've found the answer to lighting problems with a compact "General" generating set.

Gas engine driven and ruggedly built, these "General" sets are my ideal where up to 2000 watts are required.



Models available from 300 to 2000 watts, either AC or DC.

For the "General" set to solve your lighting problems, send for a complete catalog today.

DEALERS: Exclusive territories now open. Write —

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Memo to Equipment Distributors:

Whenever you take on an important new account, open up a new branch or office, or make changes in your executive personnel, we want to tell the trade about it thru the "Distributor Doings" column of *Contractors and Engineers Monthly*. See pages 88, 89, and 90 of this issue, and mail us any news of note today.

Address

Distributor Doings

Contractors and Engineers Monthly
470 Fourth Avenue New York 16, N.Y.



Embankment Contract Started Garrison Dam

World's Largest Barrier Of Rolled Earth Called "Routine" by Men Who Started First Contract

By RAYMOND P. DAY,
Western Editor

THE biggest rolled-earth-fill dam that man has ever tackled—mighty 70,000,000-cubic-yard Garrison Dam on the Missouri River—is "a routine job" to the men who are doing it.

W. B. Miller and Joe H. Carter, a pair of competent, soft-spoken southerners from Memphis, Tenn., are joint Project Managers for the first contract, and they say, "It's big, but it's just another dirt job".

The scale of operations can be accurately gaged by visualizing 55 pieces of fast rubber-tired hauling equipment moving about 60,000 cubic yards of dirt a day, with here and there a 61,500-yard output in 22 hours.

Garrison Builders, Inc., has the first \$6,349,830 contract with the Garrison District Office of the Corps of Engineers. Under this contract, which includes Stage 1 work, about 14,000,000 cubic yards of material are being excavated from the inlet channel approach, the powerhouse site, and a part of the core trench; the driving of sheet piles is included. The job also calls for construction of a 213-foot pilot tunnel 7 x 9 feet and 237 feet of 36-foot-diameter circular tunnel, for test purposes. Garrison Builders consists of three contracting firms: Forcum James Co. of Dyersburg, Tenn., H. N. Rodgers & Sons Co. of Memphis, and S. K. Jones & Son Co. of Memphis.

The contract, started September 20, 1947, should be finished by the end of the 1949 working season.

First Work Is Pioneer Job

Even after this first big contract is finished, it will seem as if Man has made only a few puny marks on the river-valley floor at Riverdale, which is about 75 miles north and west of Bismarck, N. Dak. The muddy Missouri River will not have changed its course from its centuries-old channel. That will come later, after the inlet structure, powerhouse, and penstock tubes are driven through to completion on the right wall of the valley.

Although much of the initial excavation is in a fine, well consolidated clay and silt deposit known as the Fort Union formation, the first contract might well be called a stripping job. Some of the material, such as topsoil and lignite coal seams, has to be wasted. Out of the initial excavation there is no specified level to which dam fill must be constructed. The contractor's men are using what they can and wasting the rest. Stage II work will probably establish more definite limits as to fill.

The big 12,000-foot four-zone structure is well balanced between excavation and fill, however, for the entire 70,000,000 cubic yards to be placed in the dam will be excavated from the spillway and inlet and outlet channels.

Selection of Equipment

Garrison Builders chose as its heavy-equipment fleet 37 bottom-dump Euclids of 13-yard capacity, 3 end-dump Euclids of 8-yard capacity, 16 Wooldridge 14-yard Terra Cobras, 6 Allis-Chalmers HD-19 tractors, 14 Caterpillar D8's, 3 Caterpillar D6's, and one D7.

Loading equipment consists of 2 Euclid heavy-duty elevating loaders, a Lima Model 1201 shovel, a Lima 802 shovel, a Northwest 80-D shovel, 2 Model 585 Link-Belt draglines of 4-yard

capacity, and a Koehring Model 304.

Two No. 12 Caterpillar motor graders and 2 Allis-Chalmers Model AD-4 motor graders are working haul roads and the fill. Earth-processing equipment consists of 2 sets of Tampo sheepsfoot rollers and 8 sets of Southwest heavy-duty sheepsfoot rollers. For pile-driving work in the core trench, a Northwest 95 crane and a Model 362 Marion rig are being used.

Tunnel equipment consists of 2 Worthington 500-cfm compressors, a

Blaw-Knox drill jumbo and concrete-form support, a Conway mucking machine, 10 SkilDrills, and 4 cable-drawn muck cars.

The job is expected to be so big at its peak that several manufacturers and distributors have established branch offices in the contractor's area near the right abutment, in order to give better service to the men who use their equipment. The Euclid Road Machinery Co. has parts and service there. Sweeney Brothers are represented in the area, to stock Allis-Chalmers and General Motors repair parts. And the Cummins Engine Co. has also established a branch office there.

The idea promises to be singularly successful, because, according to the Project Managers and officials of the

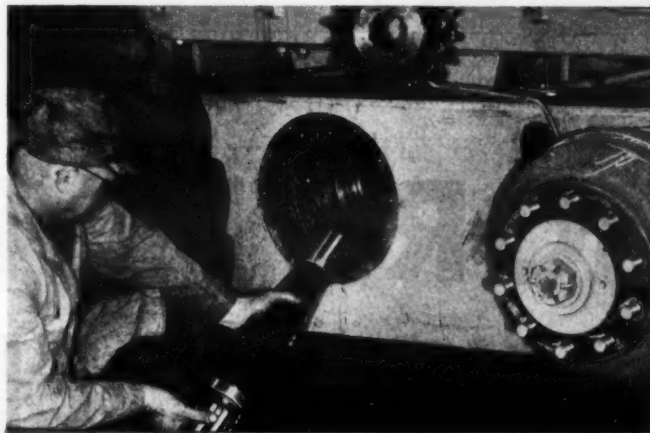
Army Engineers, there are seldom more than one or two units in at the job repair shop at any one time, and then not for long.

Excavation Methods

Excavation is being done by a staff of good dirt stiffs and operators, all under the general supervision of Joe Carter. Generally speaking, the power shovels are used for hard and inaccessible formations and the Wooldridge Terra Cobras for random and impervious excavation; and the Euclid loaders are moving Fort Union material to the hauling wagons.

The operation is so big, of course, that it changes hourly. One walking boss intercepted Carter the day we

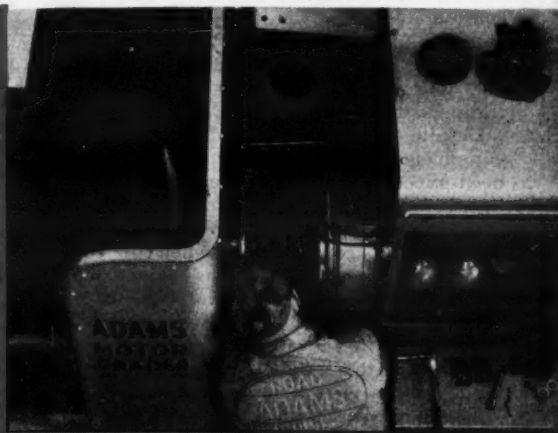
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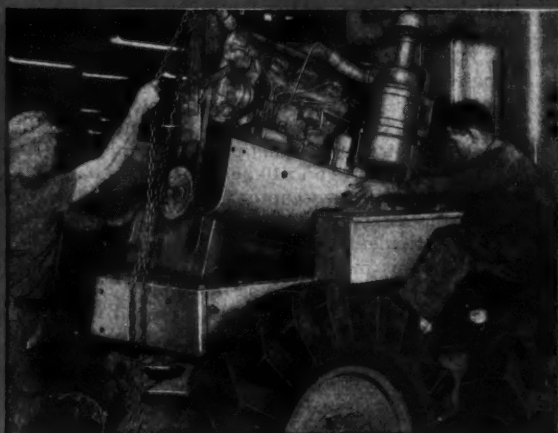
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REMOVE TRANSMISSION—
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REMOVE ENGINE—
3 HOURS OR LESS (2 MEN)

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for servicing by disconnecting and backing out the final drive assembly. This operation also permits reaching entire under half of engine.

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MOTOR GRADERS • LEADING WHEEL GRADERS • ELEVATING GRADERS

Embankment Contract Started Garrison Dam

(Continued from preceding page)

visited the job and said, "I need three more Eukes at the powerhouse, Joe". Carter responded just as quickly, "Grab three off the line as they go by".

Ordinarily the placement of fill is limited to the period from April 1 to November 1, because the dam is located in a very cold section of North Dakota. Last winter, after a freeze had closed down the fill, excavation work had been so planned that it was possible to open up an access cut to the test tunnel, and waste the material. Men and equipment worked in weather which dropped to 31 degrees below zero.

As the cut got deeper, the machines ran into several lignite seams carrying considerable seep water. Down deep this ground water was still warm enough to bleed out on the sides of the cut, to form a solid sheet-ice lining throughout the slopes.

Despite the extremely cold weather, equipment performed better than had been expected. Compressed-air control lines on the brakes of some of the machines occasionally froze up and gave a little trouble. Also, when the machines were shut down long enough to become cold and stiff, it was necessary to pull the air breathers off and spray ether in the air intakes to get the engines to start. Other than this, the machines gave very little trouble.

The lignite coal is stockpiled near the job, and some of the material is being used around camp in the central heating plant. It is a rather low-grade material, rated at approximately 6,500 Btu's per pound, which burns down to a light white ash similar to wood.

When the heavy deposits of good material are found, the machines take it to the fill. Optimum moisture content of the Fort Union formation is about 16 per cent, and the material as found in place averages 5 to 10 per cent above the right moisture content. It has not been necessary at any time, according to the Resident Engineer, to add moisture to this material on the fill.

The embankment was started by stripping about 12 inches of topsoil, rooting the ground thoroughly, and rolling it with ten passes of a sheep-foot roller. The material was then dumped and spread in a 9-inch uncompacted lift, and compacted to approximately 6 inches by ten sheep-foot-roller passes. Initial density results show an average of about 87 per cent of optimum density, calculated according to modified AASHO methods.

A 10-foot-thick pervious fill downstream from the dam axis near the natural ground level is being made with gravel dug from the inlet channel near the river. This layer of material is then covered with a 3-foot semi-pervious blanket of sand.

The equipment is always operated with a view to the week ahead, in order to blend the efforts of machines most efficiently. In all cases, enough hauling units are juggled around the loading machines to keep everything working at top capacity. During the month of June, 1948, this method paid off to the tune of 1,200,000 cubic yards moved; July saw 1,050,000 cubic yards of excavation. And these results were obtained despite unusual cool weather and some rain.

Tunnel Work

The exploratory tunnel was excavated last summer. While it forms a relatively small part of Garrison Builders' contract, this tunnel will prove tremendously important in the final design of the eight 30-foot concrete-lined tubes which will carry normal Missouri River flows through the powerhouse.

Before tunnel construction began, almost everyone doubted that the Fort



C. & E. M. Photo

Chief Inspector E. L. Knutsen looks from the right abutment of Garrison Dam down across the vast Missouri River Valley. The service road below and the access bridge across the river in the background of the photo mark the downstream toe of the dam.

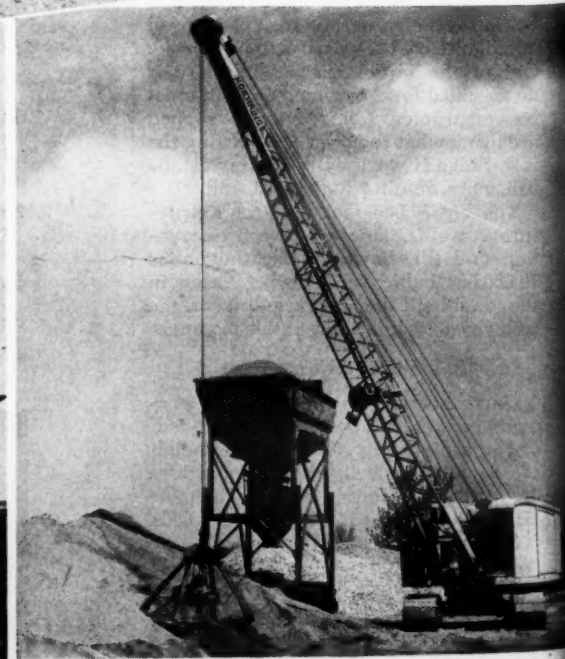
Union formation through the west abutment would stand. Tunnel construction has already proved that the material will stand very nicely on a full vertical face. Timber shoring was used in the rectangular tunnel section, and the 36-foot bore is braced with 12-inch steel H-beam arches on experimental centers from 24 to 48 inches.

Ordinary coal augers of the type commonly used in small North Dakota coal mines are used with SkidDrills, pulling a 6-foot round. The face of the 36-foot bore is shot and drilled in four portions, beginning at the bottom quarter and working up. Loosened material falls to the bottom, is loaded out by the Conway mucker, and is dumped from the cars outside the tunnel portal. A Caterpillar D8 and Carryall then hauls the material away to the dump ground.

When the main tunnels are designed and the contracts are let, the job promises to be a tunnel builder's dream on a large scale. The big tubes will very likely be drilled about 35 feet in diam-

(Continued on next page)

MORE HOURS ^{per shift} with KOEHRING





eter, and will then be lined with reinforced concrete to an inside diameter of 29 feet.

History of Garrison Dam

Explorations for a dam across the main stem of the Missouri River in North Dakota began in 1927, but not until the brilliant basin-wide Pick-

Sloan plan had been conceived did Congress authorize the project in the 1944 Flood Control Act. This plan, calling for 105 reservoirs, levees, and appurtenant structures on the Missouri and its tributaries, was conceived by Major General Lewis A. Pick, Division Engineer of the Missouri River Division, and W. G. Sloan, Assistant Regional

C. & E. M. Photos
The Wooldridge Terra Cobra at left, which is picking up a load of dirt at the powerhouse site, worked last winter at Garrison Dam during temperatures of 30 degrees below zero. At right, Allis-Chalmers HD-19 tractors pull massive Southwest sheepfoot rollers on the first dam fill which Garrison Builders, Inc., tackled.

Director of the Denver Office of the United States Bureau of Reclamation. It calls for the maximum possible development of water resources of the

basin for flood control, river navigation, hydroelectric power production, irrigation, fish and wildlife conservation, domestic water supply and sanitation, and recreation.

Garrison Dam is to be one of the largest structures in the system, and will be a key unit, along with Fort Peck and other Missouri River dams. No less important, however, are the irrigation and power dams now being designed and constructed on the main tributaries by the Bureau of Reclamation. And many a resident of the valley also hopes that Congress will grant additional funds to the Soil Conservation Service of the U. S. Department of Agriculture for the planting and erosion-prevention measures which will stop the loss of topsoil at its source.

By 1946, Congress had authorized \$6,400,000 for construction of the four preliminary projects necessary to provide ingress, egress, and a town site at the dam. The 1947 Congress approved an appropriation of \$20,105,625 for the Garrison Dam and Reservoir Project. Of this sum, \$5,105,625 was earmarked for the Indians of the Fort Berthold Reservation, whose lands will be inundated by the reservoir. The cash settlement was successfully made with them after construction had been started on the preliminary contracts, and only after a long, bitter series of negotiations with the Indians, who held the lands in perpetual trust, according to a treaty made with the United States in the 1800's.

Continuing construction of the dam will of course depend on appropriations from year to year by Congress. The estimated cost of the entire project with initial power installation is \$177,000,000.

Design of Garrison Dam

The Garrison dam site is about 200 miles downstream from the mouth of the Yellowstone River, one of the major tributaries and possibly the worst silt contributor to the main stem. It has been estimated, according to General Pick, that 23 per cent of the silt load of the Missouri River at Kansas City originates in the Yellowstone River Basin. And the Yellowstone unloads a heavy volume of mountain snow water from spring thaws. Often this comes at a time when spring rains are falling in the lower valley. This combination has produced many destructive flows all the way down the river.

In the search for a proper reservoir site, it was determined that the major impoundment should be at a point below the mouth of the Yellowstone to catch and control its flow. Garrison Dam, therefore, was located some 200 miles below the Yellowstone's mouth. It will create a reservoir approximately 200 miles long.

The dam is designed to accomplish seven objectives. It will (1) provide for flood control; (2) improve navigation on the Missouri and Mississippi Rivers; (3) provide water for irrigation;

(Concluded on next page)

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KOEHRING COMPANY Milwaukee 10, Wisconsin



Embankment Contract Started Garrison Dam

(Continued from preceding page)

(4) produce hydroelectric power; (5) permit diversion to Devil's Lake and the James River basin regions; (6) maintain a minimum low-water flow on the lower Missouri River in the interest of sanitation, and stabilize municipal water supplies; and (7) provide facilities for recreation and wildlife preservation.

The dam will be a rolled-fill earth embankment with a crest length of 12,000 feet and a maximum height above the streambed of 210 feet. The top of the embankment, which will carry relocated State Highways 8 and 28, will be 60 feet wide at an elevation of 1,875 feet above sea level. The upstream face of the embankment between the top of the dam and elevation 1,800 will be protected against wave action by riprap, 3 feet in depth, on a gravel blanket.

The dam will involve about 70,000,000 cubic yards of fill, 650,000 cubic yards of riprap, and about 525,000 square feet of steel sheet piling.

The spillway will have a discharge capacity of about 800,000 cfs. It will be of the gated type, paved with concrete for a length of 3,300 feet. Spillway construction will involve excavation of 55,000,000 cubic yards of earth and the placing of 840,000 cubic yards of concrete and 14,000 tons of steel.

The outlet works will provide penstocks to the powerhouse and tunnels for the release of water in the operation of the reservoir for flood control, navigation, irrigation, and other purposes. The tunnels will also provide for stream-flow diversion during the peak construction of the dam. Eight tunnels will be driven under the river bluffs on the west bank, about 100 to 150 feet below the surface of the earth. They will be 1,200 feet long and will be finished as previously described.

Initial power installation calls for two generators which will produce 128,000 kws. Ultimately five generators will put 320,000 kws on the Bureau of Reclamation transmission grid serving that part of the Missouri River Basin.

Personnel

Garrison Dam was designed and is being supervised under the general direction of Major General Lewis A.



C. & E. M. Photo

W. B. Miller, Project Manager for Garrison Builders, Inc., chats with Chief Inspector E. L. Kantsen and Resident Engineer George J. Gavin of the Corps of Engineers.

Pick, Division Engineer, Corps of Engineers, Missouri River Division. Early pre-construction and design work was under the direction of Colonel

W. W. Wannamaker, District Engineer, and builder of several dam projects for the Army. Operations are now under the supervision of Colonel John S.

Seybold, District Engineer, who replaced Colonel Wannamaker.

The first contract is under direction of W. B. Miller and Joe H. Carter, joint Project Managers. C. H. Hill is the Day Superintendent, Hamilton Leach is Night Superintendent. And, according to all hands, too much credit cannot be given to Master Mechanic John Hood, whose skill and knowledge, coupled with eight mechanics a shift, keep the equipment rolling.

George Gavin is the Resident Engineer for the Corps of Engineers on the embankment contract.

Porter-Cable Buys Unit

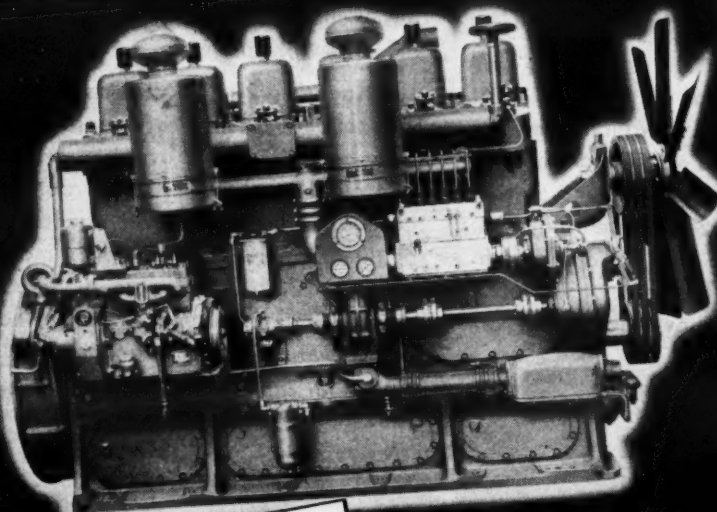
The Porter-Cable Machine Co. announces its purchase of the Unit Electric Tool Co. Both concerns have their headquarters in Syracuse, N. Y. Unit will continue to operate under its own management and name from its present address, 215 Cedar St. Executives of the Porter-Cable company are being elected officers of the new subsidiary.

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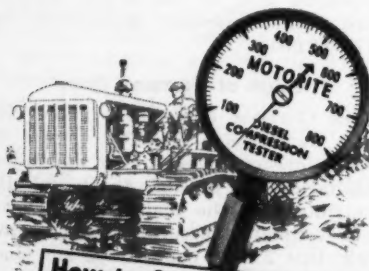
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New Roads Replace Oyster-Shell Trails

Highway Maintenance Force Builds 35 Miles, of Which 8 Are Paved With Road-Mix, On Georgia's Jekyll Island

WHEN the State of Georgia acquired Jekyll Island for a state park, in October of 1947, the original 35 miles of roads on the island were nothing more than narrow oyster-shell trails, nearly lost amid the lush subtropical vegetation. For 61 years the island had been an exclusive retreat for 100 business and banking tycoons of the north, including the Goulds, Vanderbilts, Astors, Morgans, and Pulitzers. Under the name of the Jekyll Island Club, they established the most elaborate and exclusive resort in the world on this Golden Isle off the southeast coast of Georgia, about 9 miles from the city of Brunswick and 1½ miles from St. Simons Island.

The Brunswick and Jekyll Rivers, together with the marshes of Glynn, separate the island from the mainland on the west, while the Atlantic Ocean lies to the east. The huge island, which is approximately 10 miles long and 1½ miles wide, contains around 11,000 acres. It has an ideal climate tempered by the Gulf Stream, and boasts one of the finest beaches in the country. Over 9 miles long and 300 feet wide, the beach is unmarked by groin, jetty, or other works of man. The sand is fine, and so hard-packed that the trucks and other heavy rubber-tired equipment of the road builders could run over the beach at top speed to get from one section of road construction to another.

When the State, through condemnation, acquired this island paradise for \$715,000, it also got a palatial clubhouse with an annex and many private homes. The surrounding landscaped grounds contained two outdoor swimming pools, two indoor and several outdoor tennis courts, an 18-hole seaside golf course, and numerous walks and bicycle paths. From 1886, when the heirs of Poulain du Bignon sold Jekyll Island to the 100 millionaires, to 1926, the island and all that was on it was carefully maintained in all the traditions of vested wealth. But after 40 years the original purchasers had either died off or lost interest in the hunting, fishing, or relaxation that the island afforded. Their descendants, too, had little zest for this playland. No maintenance was done on the roads since 1925. The clubhouse was used up until 1942, but then the war brought an end to this former gracious mode of living on the isolated island.

Pre-White-Man Status

The golden chain of islands along the Georgia coast includes, besides Jekyll, Cumberland, Sapelo, St. Catherine, Ossabaw, St. Simons, and Sea Island. When the first white men came to the coast of Georgia 450 years ago, they found a unique system in effect among the Indian tribes of the Creek nation who occupied the region. All these coastal islands were set aside as a public domain. No tribes were permitted to settle on the islands or claim them as their permanent or exclusive homes. On the other hand, members of all the tribes were permitted to visit the islands at the proper seasons for fishing and hunting. During these "vacation" seasons, inter-tribal disputes and contentions were laid aside, and all the visitors enjoyed recreation and sports.

When the acquisitive Europeans came on the scene, this system changed, and the islands passed into the hands of individual owners who administered them as private principalities. All of the islands, except for St. Simons which is

owned by various property holders, remained in that status until the purchase of Jekyll by the State. Thus this one island has again been made a public domain for the promotion of health and happiness of the people of the mainland.

During its interesting history, five flags—those of France, Spain, England, The Confederate States, and the United States—have flown over Jekyll. The island was named by General James Edward Oglethorpe who came from England to develop Georgia. It was called after his friend Sir Joseph Jekyll who had contributed large sums for the establishment of the new colony.

Special Maintenance Force

One of the first and most important



C. & E. M. Photo

In the lush subtropical vegetation of Jekyll Island, Ga., an Adams motor grader shapes up a new road for the state park, to replace the original oyster-shell trails. This section of road will be given a black-top pavement.

steps in the development of the new state park was the reconstruction of the 35 miles of road that traversed the island. More like trails than roads, these original lanes were only 8 feet wide with two tracks of oyster shells for vehicles to roll on. Without maintenance over the past score of years, all vestige

of the original construction had been almost destroyed by the thick jungle vegetation. Ferns, vines, and the ever-present palmetto bush, had encroached on both sides of the narrow pathways. New trees had sprung up and old trees had grown larger. The task confronting

(Continued on next page)



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New Roads Replace Oyster-Shell Trails

(Continued from preceding page)

the State amounted practically to building 35 miles of highway through new location.

Accordingly a special maintenance force of the Highway Department was assigned to Jekyll Island State Park to reconstruct all the original roads. This meant clearing, grubbing, draining, grading, and shaping 35 miles of new roadbed. It also meant putting a black-top pavement on 8 of the most important miles of the island road system. Construction started on March 12, with the maintenance force averaging 60 men. By May the grading was far enough along so that paving could be started. The road work was scheduled for completion by August, 1948.

Road Section

Clearing was done along a 35 to 45-foot-wide strip to provide room for a 24-foot roadbed. On the paved stretches the black-top is 18 feet wide flanked by 3-foot shoulders. The greater percentage of unpaved road mileage was topped with shells of oysters or clams, which are available in large deposits in the bays off the western shore of the island. From the roadbed the front slopes drop down 3 to 1 to a 1-foot-wide flat-bottom ditch which is 1½ feet below the top of pavement. Backslopes are 1 to 1.

The old roads zigzagged around the island with little attention to good alignment or gentle curves. Changes in direction were made abruptly with a sharp bend or crook. In their stead the new roads are straightened out as much as possible, and the turns are curved gradually. Every effort was made, with the new line, to spare the older trees. This sometimes required the front ditch slopes to be made 2 to 1 instead of 3 to 1 in order to miss a choice tree or bush.

Clearing and Grading

Practically nowhere could a shovelful of dirt be graded until the surface of the ground had first been cleared and grubbed. During the past war some choice virgin timber had been cut on the island, and where the remaining stumps of these trees lay in the path of the road they were blasted out with dynamite. The maintenance crew removed only a few whole trees, and these were felled with dynamite. The hardest part of the job was grubbing out palmetto roots, which are tough and grow in great profusion over the island. The roots of the live oaks also gave trouble.

Most of the grubbing was done by a dozer blade on a Caterpillar D8 tractor which dug out the roots and heaped them into piles for burning. An Allis-Chalmers Model S tractor was used to pull a harrow and scarifier over the ground, cutting and loosening the vegetation. This smaller tractor, with a cable, also pulled out some stumps.

Grading, involving about 60,000 cubic yards of earth-moving, followed the clearing and grubbing. The job entailed a good bit of borrow which was taken from large mounds or hummocks and hauled to the roadbed. A double purpose was served in leveling some of these mounds. They provided material for the road embankments, and after



C. & E. M. Photos

leveling can be turned into parking lots. A beach casino was planned at the site of one big hummock along the ocean shore.

A Lorain dragline with a 40-foot boom and a ⅝-yard bucket handled the

Practically nowhere on Jekyll Island could a shovelful of dirt be graded prior to cleaning and grubbing. Here, at left, a pile of brush is being burned. And at right a dozer has just run through the jungle entanglement which encroached on the old island trails.

excavation, with the material hauled in ten 1½-ton trucks. The average dirt

haul on the project was ¾ mile. After
(Continued on next page)

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C. & E. M. Photos

The sand dunes in the first of these photos of Jekyll Island will be graded for a parking lot and beach casino overlooking the Atlantic. The Lorain 3/4-yard dragline in the second photo loads a truck with sand from the borrow pit. The D8 tractor-doser, third photo, levels a borrow pit for a parking field near the golf course and the ocean beach.

the dirt was dumped it was spread on the roadbed by the dozer, or by a pull grader towed by the smaller tractor. Final shaping was done by an Adams motor grader, and the surface was then rolled by a Huber 10-ton 3-wheel roller.

The dragline was also employed for ditching and trenching, and laying over 500 feet of reinforced-concrete pipe from 18 to 30-inch diameter.

Black-Top Paving

The 8 miles of road which were paved at a cost of about \$40,000 are in the central part of the island, crossing it in two locations from Jekyll River to the ocean beach. North and south pavements also run between these cross roads on both sides of the island. The 18-foot pavement is a mixed-in-place sand-asphalt with a 6-inch compacted thickness. Native sand of the island supplied one of the materials, while the Mexican Petroleum Co. furnished the RC-2 cut-back asphalt.

The bitumen was shipped in tank cars from Port Wentworth, near Savannah, Ga., and transferred at Brunswick to a 25,000-gallon storage tank which was carried on a barge. This tank easily held the contents of two 10,000-gallon tank cars. When everything was ready, the barge with the asphalt tank was towed to Jekyll Island, a 1 1/2-hour haul, by a tug of the Gray Towing Co. of Brunswick.

In the meantime, on the island the trucks had hauled sand from the borrow pits and dumped it on the roadbed where it was spread out to a loose depth of 8 inches by the grader. Then the grader shaped this sand into two windrows down each half of the road. When the asphalt arrived at the island dock, a 1,000-gallon distributor pumped out a load and then hooked onto a Wood Roadmixer. The mixing machine then advanced over a windrow under its own

power with the distributor following along behind. The asphalt was fed to the mixer at 150 degrees F, and applied at the rate of a gallon of RC-2 to the square yard.

After the machine had mixed the sand and asphalt in each windrow, the grader worked the material back and forth across the road in several passes until it was well aerated and all the cut-back evaporated. Then it was shaped to a 2-inch center crown, and

compacted to a 6-inch thickness by a rubber-tire roller. A final rolling was given by the steel-wheel roller. The grader built 3-foot shoulders on each side of the 18-foot black-top pavement.

Supplies and Personnel

All equipment and supplies, including

fuel oil and gas in drums, had to be brought to the island by barge. Of the 60 maintenance workers building the roads, 20 of them, who were white, lived on the island in some of the existing buildings. They were the equipment operators, the truck drivers, and skilled

(Concluded on next page)

HERE'S SOMETHING THE DICTIONARY DOESN'T TELL YOU ABOUT

Capital

WEBSTER* SAYS: "CAPITAL, is the amount of property owned by an individual or corporation . . . which is used for business purposes."

That's only part of the story: How well that capital is employed spells the difference between profit and loss. Under today's business conditions, every concern has many urgent demands made on their current funds and, when new machinery and equipment must be bought, the purchase depletes the money needed for other purposes.

Obviously, the dictionary doesn't tell you how to obtain additional capital with which

to acquire machinery and equipment . . . but C.I.T. does! WE WILL FURNISH MONEY TO FINANCE YOUR PURCHASE. Terms can be arranged which permit repayment out of income over extended periods.

Our financing presents a practical way to buy equipment without tying up working funds . . . and your capital is left free for the profitable operation of your business. If you're interested in knowing how to go about it . . . taking the steps necessary to arrange equipment financing . . . ask any of the offices listed below to furnish full information.

* By permission, From Webster's New International Dictionary, Second Edition, copyright, 1934, 1939, 1945, by G. & C. Merriam Co.

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C.I.T. CORPORATION

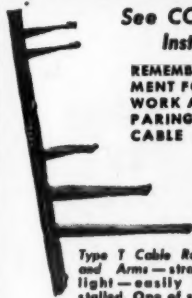
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Men Working Sign—strong yet easily handled—withstands wind and tough weather—A Warning Sign That Really Protects.



Type 264 Manhole Guard Rail—SOLID—GOOD-LOOKING—A Protection for You. Available with or without panels.

T. J. Cope Inc. 4921 Penridge St. Philadelphia 43, Pa.

CABLE INSTALLATION & MAINTENANCE TOOLS & EQUIPMENT

New Roads Replace Oyster-Shell Trails

(Continued from preceding page)

workers. They worked a 10-hour day. The other 40 were negroes from the mainland who left on a 7 a.m. boat, arriving on the island at 8 a.m. They worked a 9-hour day, with a half hour for lunch, and then returned by boat.

At present, visitors to the state park reach the island by ferry on the famous old stern-wheeler steamboat, the Robert E. Lee, which has a capacity of 700 passengers. It makes three round trips daily. The Jekyll Island Clubhouse provides 300 rooms for visitors, and more will be added when the eight deserted mansions, former homes of the island's millionaires, are converted into apartments for vacationers. Furniture has been removed from all but the Rockefeller House, built in 1896; that will remain, as a showplace for tourists.

Boar, deer, racoon, and other wild life still roam the island. In the full of the July moon the great sea turtles come out of the deep to lay their eggs in the sand high up on the beach, where they are hatched by the warm sun. The sporty 18-hole golf course has been reclaimed and put into condition. The course is now open to the public. Other sports will include tennis, softball, badminton, horseshoe pitching, croquet, horseback riding, trap shooting, cycling, and fishing. Yachts traveling the inland waterway from Boston to Key West can tie up in the yacht basin or at the newly finished dock. The state park has a sightseeing bus, but when this article was written, no private automobiles had access to the island.

New Causeway From Mainland

This will not be for long, however. The Georgia State Highway Department has already awarded a contract for the construction of a causeway from the mainland to Jekyll Island. The work will be done by the W. L. Cobb Construction Co. of Decatur, Ga., which submitted a low bid of \$2,266,486—more than \$1,000,000 less than the only other bidder, The McWilliams Dredging Co. of New Orleans. Dredging operations, which will play a major part in the construction, will be done for the Cobb firm by the Hendry Corp. of Rattlesnake, Fla.

The new approach highway will be about 12½ miles long. It will extend from the intersection of U. S. 17 and U. S. 84 on the mainland, across marsh and water to the banks of the Jekyll River opposite the state park. A 1,500-foot bridge across this stream will be let in a future contract, thus completing the connection to the island. Some time in the future, the Highway Department will award a contract for another bridge to cross the Brunswick or Turtle River just east of the South End shipyard in Brunswick. This latter connection will shorten the distance between Brunswick and Jacksonville, Fla., and also make the new state park more readily accessible from the north.

Two other bridges are likewise to be built as part of the causeway. One over Cedar Creek will be 290 feet long, while the other will be a 618-foot structure over Fanny Bluff Creek. All three bridges on the causeway proper will have bents of steel H-piles encased in concrete, with a superstructure of steel beams encased in concrete supporting a reinforced-concrete deck.

The causeway will be in two parts. The western 7 miles from U. S. 17 as far as the bridge crossing into Brunswick will have a dual 24-foot bituminous pavement. This section will also be U. S. 17 when that part of the Coastal Highway is rerouted through Brunswick. The remaining eastern 5½-mile portion of the causeway will have a 22-foot bituminous pavement. Pavement on both will consist of a 12-inch sand-limerock stabilized base topped by a

double bituminous surface treatment.

The dredging operations in connection with causeway construction consist of the removal of a layer of muck, averaging 8 feet thick, from the path of the new roadway. This muck will then be replaced with clean, white, hard sand taken from borrow sources adjoining the causeway.

Supervision

The maintenance force which constructed the Jekyll Island State Park road system was supervised in the field by Maintenance Foreman G. W. Crews. Harry J. Glynn is Superintendent of the park. The project is in the residency of C. P. Chapman, Resident Engineer, with headquarters at Brunswick. C. P. Smith is Assistant Division Engineer in Charge of Maintenance. J. O. Bacon is Division Engineer of Division 5 of the Georgia State Highway Department, with offices at Savannah. The Department is headed by J. C. Beasley, Director, with W. R. Neel Deputy Director and State Highway Engineer.

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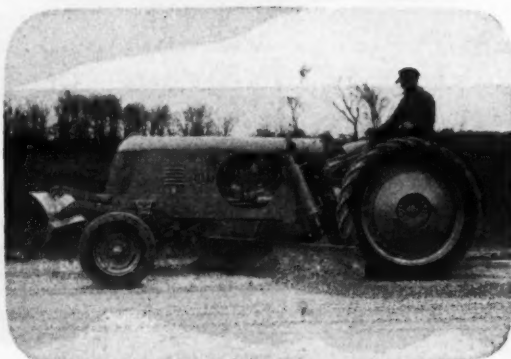


A Smart Move

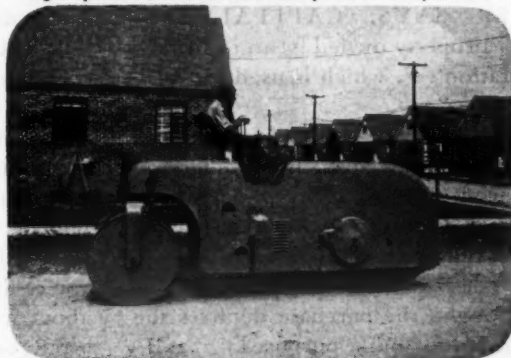
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HUBER MAINTAINER
Easily converted to a bulldozer, lift-loader, patch roller, highway mower, berm leveler, snow plow, or rotary broom.



HUBER TANDEM ROLLER
Variable weights in three models from 3 to 14 tons.



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Now is the logical time to ready your organization and equipment for the long construction grind ahead. Realize new profits next year by turning to Huber road machinery. It's a move that will save you time and money, because Huber machinery is built for speedy operation with plenty of power and stamina to assure longer years of trouble-free service. See your Huber distributor today and let him show you the important features that are built into each Huber machine.

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Cost Consciousness Is Urged of Builders

At the fall meeting of the American Society of Civil Engineers, builders were urged to think in terms of costs during construction operations. H. P. Maxton, Secretary-Assistant Treasurer of the Raymond Concrete Pile Co., pointed out that construction-cost controls, expertly wielded by government and private builders, would do much to curb building costs.

Previewing a manual under preparation by the Society's Committee on Basic Accounting Procedures, of which he is the Chairman, Mr. Maxton stated, "No business can long survive without a knowledge of costs and without an intelligent control of costs". He pointed out that the most common cause of loss on construction jobs is just plain inefficiency of management and supervision—not a flood, adverse weather conditions, or other more dramatic phenomena. Mr. Maxton also pointed out that it does little good to analyze costs and hold post-mortems when the job is complete. The real need, he pointed out, is to establish cost analysis and cost studies as quickly as possible when the job gets going.

In another paper, R. H. Heitman, Chief Engineer, Western Contracting Co., Sioux City, Iowa, asserted: "Some contractors may have the theory that the construction man on the project should not know what the work is costing but should just do the work as best he can". This school of thought has no place in modern competitive-bidding contracting, he added. Cost reports prepared from the cost accounting system every week or two enable construction men to catch immediately any item which is running off and to take corrective measures before it is too late. Also, a running report will help the contractor in bidding on new work, especially in times of inflation.

Kenneth W. Markwell, Assistant Commissioner, Bureau of Reclamation, Washington, D. C., presented a third paper in which he said that he considered cost controls an indispensable tool of management in directing, controlling, and reporting work from the initial investigation through construction. He pointed out that the Bureau, in order to protect the investment of the public, must know the status of funds in relation to obligations so that it does not over-obligate funds in the current fiscal year and thereby incur a deficiency. So, too, the contractor needs cost controls for protection of his own solvency and profits.

LeTourneau Ups Richards

Wendell V. Richards has been named Central Sales Manager by R. G. LeTourneau, Inc. He succeeds W. B. Worden, who resigned to accept a position with the Noble Co. of Oakland, Calif. LeTourneau's central territory covers twenty midwestern states and three Canadian provinces.



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- EVERLASTING FACE RODS ENGRAVED IN PLASTIC
- EXPERT REPAIRS

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INSTRUMENT COMPANY
1405 Walnut Street, Kansas City, Missouri



No, not a roller coaster—a three-arch concrete bridge under construction by Dinardo, Inc., to carry the Penn-Lincoln Parkway from Edgewood across Nine-Mile Run to the eastern approach of Squirrel Hill Tunnel (See C. & E. M. Oct., 1948, pp. 52-53). In this view, Blaw-Knox steel centering is in place and a Blaw-Knox concrete bucket completes the pour on the second arch.

Dump Bodies and Hoists

Hydraulic hoists and dump bodies are illustrated and described in two bulletins distributed by The Perfection Steel Body Co. of Galion, Ohio. Bulletin 447 CL discusses the Models 615, 715, and 720 hoists for use with the Type 100 bodies for light and medium-duty trucks; and Bulletin 848 ALG discusses the Models 725, 727, 827, and 1027 for use with the 200 and 300 Series bodies for medium and heavy-duty trucks.

Hoist specifications listed in both catalogs cover the angle of dump permissible with each unit, its mounting height, bore of the cylinder and area of the piston, piston stroke, piston displacement, oil capacity, and weight. The bulletins also list the styles of bodies manufactured in each series, their principal uses, and their capacities. The Perfection guarantee is reprinted in the catalogs.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 36.



Close to ground felling saves waste



Fast bucking and under cut bucking



Limbing from any position

Z-Z-Z-Z-I-N-G and down it goes!

... fast, easy, and at a saving with the

DISSTON

ONE-MAN CHAIN SAW

WITH MERCURY GASOLINE ENGINE

It's only a matter of seconds . . . about 30 to fell an 18-inch tree . . . and all this power in the hands of one man. Bucking and limbing cuts take even less time. Think what speed like this can mean to you in increased production and lower timber-cutting costs!

Wherever used you can count on dependable performance, long life and low cost maintenance.

Light weight. 3½ h.p. Engine. Easy starting and stopping. Simple operation, all controls in one hand. Runs in any position, even upside down, without adjustment. Self-lubricating throughout. Weatherproof and dustproof. And it bears the Disston guarantee.

For further particulars, get in touch with your nearest Disston Chain Saw Dealer or send in coupon.

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Dear Sirs: Please send me full particulars regarding the DISSTON ONE-MAN CHAIN SAW.

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In the Lawrence centrifugal self-priming pump, a stream of liquid heavily laden with air is circulated from port A through the air separator, where the air is separated from the liquid; then through port B back to the pump casing and port A, where it picks up another load of air. This continues until all air is exhausted from suction line, suction chamber, and pump casing. The unit then operates as a regular side-suction centrifugal pump.

Self-Priming Pump Runs as Centrifugal

A new pump is announced by the Lawrence Machine & Pump Corp., 371 Market St., Lawrence, Mass. It is designed to operate as a positive air pump during the priming operation, and subsequently, as a regular centrifugal pump without recirculation or loss of efficiency. The pump operates without valves of any kind. According to the manufacturer, it is necessary only to fill the pump casing and the suction chamber with liquid when the pump is first started.

In operation, a stream of liquid is circulated into the air separator and back into the pump casing. The stream of water picks up air in the casing and discharges it through the separator. This process is continued until all air has been exhausted from the suction line, the suction chamber, and the pump casing. The unit then operates as a regular side-suction centrifugal pump. The

casing is in the form of a volute with two discharge ports located opposite each other, and each proportioned for one-half normal capacity of the pump.

According to the manufacturer, the Lawrence pump, like other types of centrifugal pumps, can be used for pumping liquids which contain solids and abrasive matter in suspension. It can be provided with an open or enclosed-type impeller depending on service requirements, and can be made from abrasion or corrosion-resistant metals.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 18.

Report of Committee On Maintenance, ARBA

The Committee on Maintenance newly established by the American Road Builders' Association presented its first report at the ARBA convention in Chicago last July. Under the chairmanship of A. O. Cuthbert, Engineer-Director of the County Road Association of Michigan, it recommended that county and local road administrators revise their bookkeeping systems so that maintenance costs across the country could be accurately compared. And it proposed as possibly its most valuable function promoting the exchange of ideas on maintenance methods.

Cost distribution and methods of keeping costs vary so much among county road administrators, said Mr. Cuthbert, that no honest comparisons can be made. Therefore, the Committee recommended that budgets be set up to differentiate between the maintenance costs of the (1) basic road structure, and those of the (2) special service functions.

Under (1) would fall the cost of maintaining the traveled surface, shoulders, roadside, drainage, and traffic and directional signs. Under (2) would fall the cost of snow plowing, ice control, weed and brush control, pavement marking, etc.—which add nothing to the basic road structure but are special-service or readiness-to-serve items.

If this system were set up, said Mr. Cuthbert, a questionnaire seeking information on various types of maintenance costs could be answered with reasonable uniformity across the country. And the cost data obtained would serve as a more accurate yardstick for administrators who wanted to compare their costs with those in other areas.

The Committee also proposed an ex-

change of ideas on more efficient maintenance methods. Mr. Cuthbert remarked that special equipment uses are often developed in one area to handle certain work. They could be used just as well in other areas if brought to the attention of road administrators. He cited as an example Michigan's use of under-body truck scrapers instead of motor graders for gravel maintenance. Since they cost less, cut down on operators, are faster, make a combined maintenance grader and gravel haul truck out of each truck they are mounted on, and do a good job on the roads of that state, they are worth consideration by other states, he pointed out.

To provide an airing of maintenance practices such as this one might prove to be the most valuable function which the Committee could perform, he said in closing.

Directors for Blaw-Knox

Two Directors were recently elected by the Blaw-Knox Co. They are David D. Kennedy, President of the Foote Co. of Nunda, N. Y., a Blaw-Knox subsidiary; and Robert W. Frank, President

of the Lewis Foundry & Machine Division of the company.

Percussion-Type Bits

A bulletin describing the features of percussion-type Rockbits has been made available by the Rockbit Sales & Service Co., 2514 E. Cumberland St., Philadelphia 25, Pa. Among the features claimed for these tungsten-carbide-tipped drill tools are fast drilling, long life, time saving, and cost cutting. They are available in two styles, one for drilling in all types of non-metallic construction materials such as slate, concrete tile, brick, marble, granite, and other materials, and the other for use as a chisel as well as a drill.

The bulletin describes the three types of shanks and two styles of tapers in which these star and chisel drills are furnished. They are said to fit all standard chuck wrenches for electric or air-operated hammers. The bulletin also contains a listing of all the bits in the line.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 66.

SPEED OPERATION for Snow Plows and Road Machinery with the . . .

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New and Improved HY-LO-JACK

Fan Belt Driven

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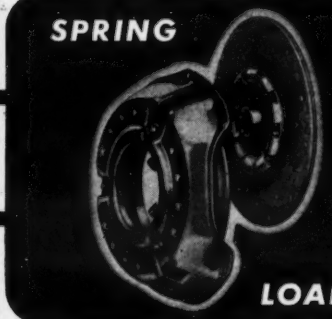
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Design and build your products to suit their functional needs—and let us build clutches best suited to control and transmit their power. Given the operating essentials of your products—we produce clutches to fit the specific needs of your product. Specializing in clutch building, our experience covers over thirty years of clutch research, design, production and field service in hundreds of industries. Write for our latest bulletin which shows typical installations of ROCKFORD CLUTCHES and POWER TAKE-OFFS with diagrams of unique applications, capacity tables, diameters and specifications.

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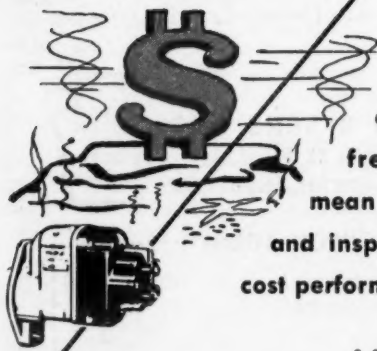
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TOPS...for rock-bottom economy!

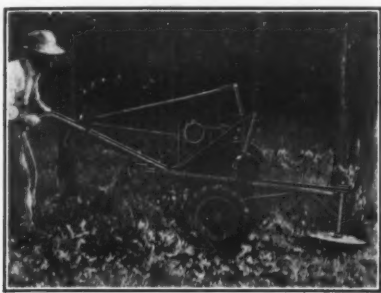


... Fairbanks-Morse magneto ignition can't be equaled for long-run, service-free operation! Fewer parts mean fewer delays for servicing and inspection—more hours of low-cost performance.

... Your Magneto Ignition by

FAIRBANKS-MORSE

Sold and Serviced by Over 2,000 Experts



The Ottawa Buzz Master self-propelled saw is mounted on a 2-wheel chassis.

Portable Power Saw Is Self-Propelling

A portable self-propelled power saw is manufactured by the Ottawa Mfg. Co., 624 King St., Ottawa, Kans. It is recommended by the company for use in clearing right-of-ways, eliminating brush and small trees, ridding roadsides of obnoxious weeds, and similar operations. The Buzz Master has a 30-inch saw blade, and is supplied with a 6 or 7-hp gasoline engine.

Among the features claimed for the saw are crank-shaft roller bearings, speed-control lever, belt adjuster, Zerk greasing system, swinging handle support, extra-strength single V-belt, quick-changing saw guard, instant saw positioning, adjustable saw shaft, and others. The saw is mounted on a two-wheel chassis equipped with 4.00 x 12 mud-grip tires. The self-propelling mechanism can be omitted if not desired. A swivel-type axle is designed to prevent damage to the saw blade should one wheel drop into a rut or run over a stick while the saw is in operation. The swivel action is engaged by means of a cord in front of the operator. Available for use with the Buzz Master are a post-hole digger and a saw attachment.

Further information may be secured from the company or by using the enclosed Request Card. Circle No. 7.

Compact Salamander Warms Winter Work

A compact oil-burning salamander designed to give safe clean heat is manufactured by Scheu Products Co., Ltd., Upland, Calif. It features the use of a return pipe to recirculate the products of combustion, thus providing for better combustion and reducing residue. The Hy-Lo salamander operates on kerosene or fuel oil.

The Scheu unit can be used for inside or outside construction, for keeping freshly laid concrete warm, for heating portable field offices, and so forth. It is said to develop 100,000 Btu's per hour and will operate from 10 to 20 hours without refilling. It has no wick, valve, jets, or other parts which require replacement or repair, the manufacturer points out.

These salamanders are carried in stock by distributors in practically all of the large eastern cities, for speedy delivery east.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 21.

A Discussion of Grouting, Its Methods and Equipment

Grouting methods and equipment are described in detail in an informative 4-page folder prepared by Robert S. Mayo, Consulting Civil Engineer, of Lancaster, Pa. A feature of the bulletin is a detailed discussion on the use of grouting in dam foundations, in shafts and tunnels, and in other applications. The types of tunnel work listed include grouting in back of lagging in rock tunnels, in back of liner plates in soft-ground tunnels, in shield-driven tunnels, and in tunnels before lining operations.

The bulletin also covers in detail the Mayo-designed pneumatic grouting machine and its operation. It explains

how grout is kept alive by agitation; how neat grout, sand grout, and other grout mixtures differ; how the grouter can be used to shoot pea gravel into the voids outside the primary lining of soft-ground or shield-driven tunnels; how it can be used as a mixer for small quantities of grout; and how it is used for high or low-pressure grouting. Drawings show how the machine is constructed; how grout pipes are set and connections made; how to convert the grouter to a "pea shooter"; how to grout wet seams in good rock; and how to grout wet areas in fractured rock.

Copies of this literature may be obtained from Mr. Mayo. Or use the enclosed Request Card. Circle No. 59.

PCA Names Fred McComb

Fred R. McComb has been appointed District Engineer of the Minneapolis Office of the Portland Cement Association. He succeeds Frank S. Altman, who has retired after 28 years with the Association.

Photo-Copying Unit Features Portability

A photo-copying unit in a kit with complete processing facilities and self-contained dark room is announced by Fairchild Aerial Surveys, Inc., 53 W. Union St., Pasadena 1, Calif. According to the manufacturer, the Copy-Roll unit itself weighs under 2 pounds and can be used to reproduce any material whether written, typed, lettered, printed, drawn, or photographed. The material to be copied may be on a transparent or opaque surface, may be in black and white or color, may be bound or loose, and may be single or double size.

Exposures are made by flicking on the light and running the Copy-Roll roller over the material to be reproduced. The sponge-applicator method of development is said to make development possible in any location in 2 minutes.

Further information on this photo-copying unit may be secured from the

company, or by using the enclosed Request Card. Circle No. 20.

Dust-Protection Mask

A respirator for protection against nuisance dust is announced by the American Optical Co. of Southbridge, Mass. The R-2900 is designed to protect the wearer against light concentrations of dust encountered in woodworking, handling cement, grinding, and other exposures not involving pneumoconiosis or silicosis producing dusts.

The R-2900 allows an unobstructed front and side vision. The filter is lightweight and easily replaceable. The face mask is molded from a high-quality rubber and is said to provide a comfortable and positive fit. The retainer cup is made from a light, durable material. Inhalation and exhalation valves are designed to prevent dust infiltration and at the same time allow easy breathing.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 14.

Built to take a 10-ton load off your mind!

Wheeling a 10-ton load is as routine as easing over a 10-inch bump to this big International six-wheeler!

That's because it's packed with power from bumper to tailgate. It's built to make tracks through sand, muck, and mire, to fight its way up grades that would knock the heart out of an ordinary truck.

Performance like this is a habit with Internationals. There are 22 basic models, eight of them six-wheelers—each a champion in its own right.

Whether their gross weight rating is 90,000 or 4,400 pounds, they all rate tops in driver advantages as well as performance. Drivers swear by 'em because they do a good job fast and take a beating without giving the driver one.

And that's not all. You'll find yourself swearing by 'em when you discover how easy they are to service. Thousands of International Dealers and 170 company-owned Branches—coast to coast—offer you the nation's largest exclusive truck service organization. Whether at home or 3,000 miles away, you can get International service, precision-engineered parts, factory-built exchange units and whatever your International needs... quickly and at low cost.

So, whether you haul gravel, granite, sand or cement—it will pay you to find out what the "Standard of the Highway" can do for you. The sooner you do this, the quicker you will start getting more hauling miles out of every trucking dollar.



Tune in James Melton and "Harvest of Stars," CBS, Wednesday Evenings



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Concrete Floodwalls Are Built Along River

Will Protect Cities on Both Banks of Atchafalaya Where Great Floods Have Spread in the Past

By WILLIAM H. QUIRK,
Eastern Editor

RESIDENTS of Morgan City and Berwick, La., on opposite banks of the Atchafalaya River, no longer need to fear a repetition of the great floods of 1912, 1927, and 1945, when the river swept through the streets of their cities. For the Corps of Engineers, Department of the Army, is now giving these people flood protection in new reinforced-concrete walls, set on piles, which are well above previous flood heights.

Although broad and deep, the Atchafalaya River has often proved too constricted at this point for the great volumes of water rushing down to the Gulf of Mexico from the large upstream storage areas of Grand Lake, Six Mile Lake, Lake Palourde, and also from the vast Morganza and West Atchafalaya Floodway. At such times the river has overflowed its banks, and the unprotected cities have suffered.

Morgan City has been partially protected in the northern section with a floodwall that was built before the war. This extended southward from the East Atchafalaya Basin Protection Levee as far as Brashear Avenue just above the highway bridge spanning the river. But the central part of Morgan City was exposed, and was spared from serious damage in 1945 only because a temporary earth dike was thrown up in front of the city to hold back the waters. The war put an end to the extension of this floodwall project along

the river, and it was not picked up again until last year.

Then the Corps of Engineers, New Orleans District, awarded a \$325,000 contract to the Keller Construction Corp. of New Orleans, La., for the construction of a reinforced-concrete wall, 1,934 feet long, at Morgan City on the east or left bank of the river. It extends from the existing wall southward along Front Street to tie in to the embankment of the Southern Pacific railroad at the railroad bridge crossing the river.

Berwick, across the river on the west or right bank, never had the protection of a floodwall. Its new structure is 5,278 feet long, and extends along the entire front of the city. It was constructed by the Hendry Corp. of Rattlesnake, Fla., under a \$420,000 contract to the Corps of Engineers. Work on both walls started in July, 1947, and both contracts were completed last summer. On the north, the Berwick wall ties in to a newly constructed mile-long levee, which is a continuation of the West Atchafalaya Basin Protection Levee. South of the city, it will connect with another levee, still to be built, which will continue the levee system down the Atchafalaya River to the Intracoastal Waterway.

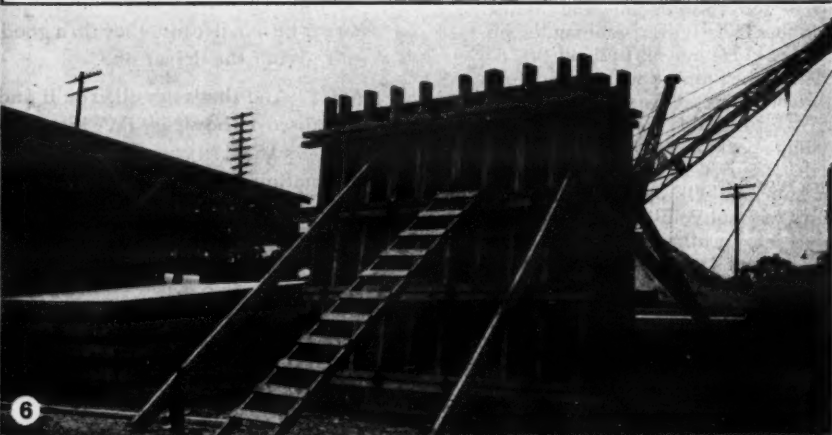
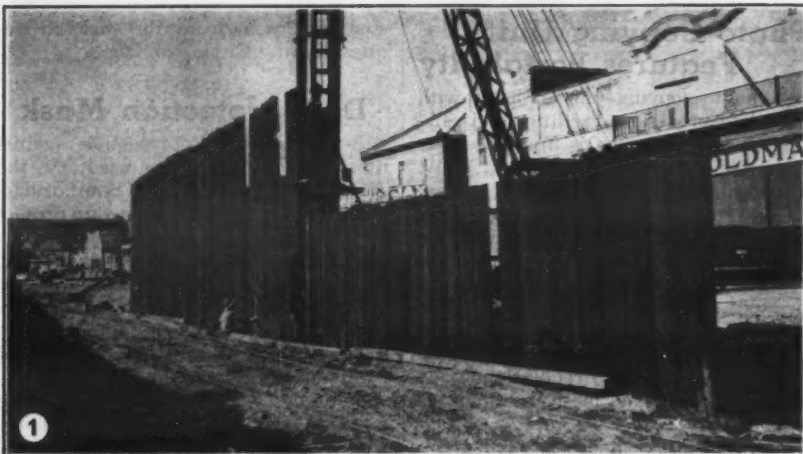
Morgan City Floodwall

The original wall in the northern part of Morgan City is in the center of the street, and the divided traffic moves along on both sides of it. The new section is located beyond the west side of Front Street and so protects the entire thoroughfare. Between the wall and the river is a strip of land averaging 50 feet in width which carries a spur

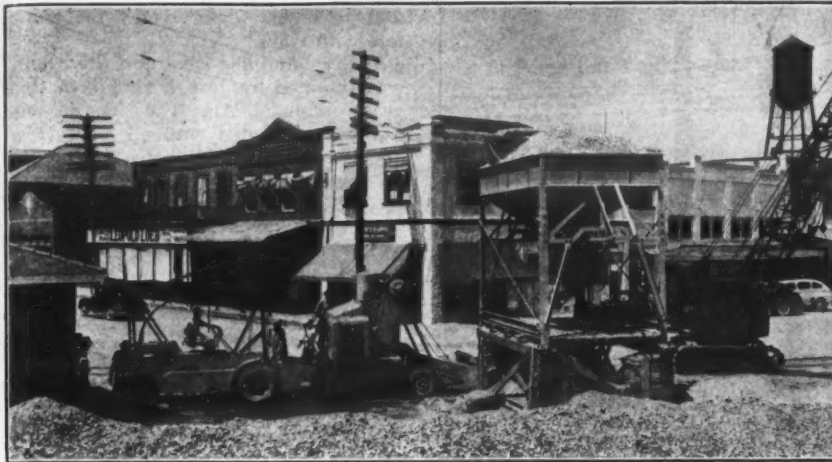
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1. M-115-section steel sheet piling supports the footing of the Morgan City floodwall which Keller Construction Corp. built. 2 and 3. At the rear of the footing, battered timber piles were driven to take care of the overturning moment. 4. This view looking north along the new Morgan City wall shows a gap for a railroad spur track in the foreground, and the highway bridge over the Atchafalaya River in the background. 5. On the Berwick side of the river, where another floodwall has been built, workers tack-welded steel reinforcing at the moment bars. 6. Wall forms were built around the steel later. 7. Hendry Corp. constructed the Berwick floodwall, which is 5,278 feet long and extends along the entire front of the city.

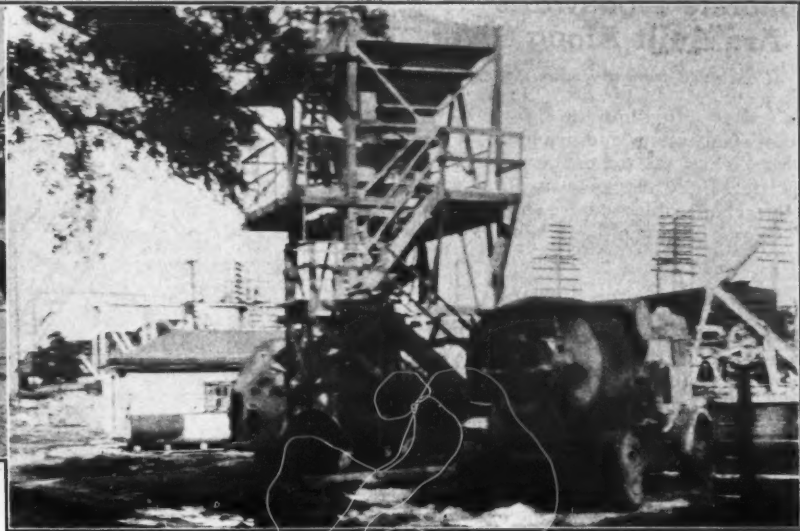
C. & E. M. and U. S. Engineers Photos



BERWICK FLOODWALL



C. & E. M. Photos
On the Morgan City side of the Atchafalaya River floodwall project (above), a Wagner Scoopmobile gets a load of concrete from the Jaeger 16-S mixer at the batch plant. On the Berwick side (right), ingredients pass from the Heltzel batch plant to two Rex Moto-Mixers.



of the Southern Pacific Railroad to the industrial area along the docks. The economy of Morgan City depends on the river to a great extent, for the Atchafalaya is the highroad for the fishing fleets and shrimp luggers which bring their catches from the Gulf to the canning and packing factories located along both banks. The same is true of Berwick across the river.

The new wall is the cantilever type with a 24-inch-thick footing, 5 feet 9 inches wide. This is supported, 12 inches from the front, by M-115-section steel sheet piling, 20 feet long, with the steel projecting 12 inches into the concrete. To take care of the overturning moment, battered timber piles were driven at the rear of the footing, 18 inches from the back edge. These piles are 35 feet long, have a batter of 3 vertical to 1 horizontal, project 9 inches into the footing, and are spaced on an average of 4-foot centers.

Back 4 inches from the front of the footing rises the wall stem, 15 inches thick at the bottom and 12 inches at the top. It is surmounted by a cap 24 inches wide and 9 inches thick. The top of the wall is at elevation 13.0, and provisions were made for anchoring a mud box on top to add 2 more feet to its height with flashboards. The height of the wall varies from 6 to 9 feet, according to the contour of the natural ground which ranges between 4.3 and 7.3. This height is designed to take care of any flood comparable to the past recorded ones. On April 1, 1945, the Atchafalaya crested at 8.76, while the other two previous high-water marks were also below the present height of the wall. On June 10, 1927, the river went to 9.7, and on June 13, 1912, the high was 9.6.

There are eight openings in the wall. One gap at the lower end admits the railroad spur; five gaps, with widths of from 24 to 40 feet, are for vehicular traffic; while the other two are 8-foot openings for pedestrians. All are fitted with stop-log emergency closures which can be shut in a short time. Recesses are built into the two ends of the wall at the gap to receive the 6 x 8-inch x 8-foot sawed railroad ties which are used to breach the opening when the water rises. On the openings over 8 feet in width, concrete footings with steel bracing are used to support a series of timber-tie closures. The footings on the land side of the gap are 2

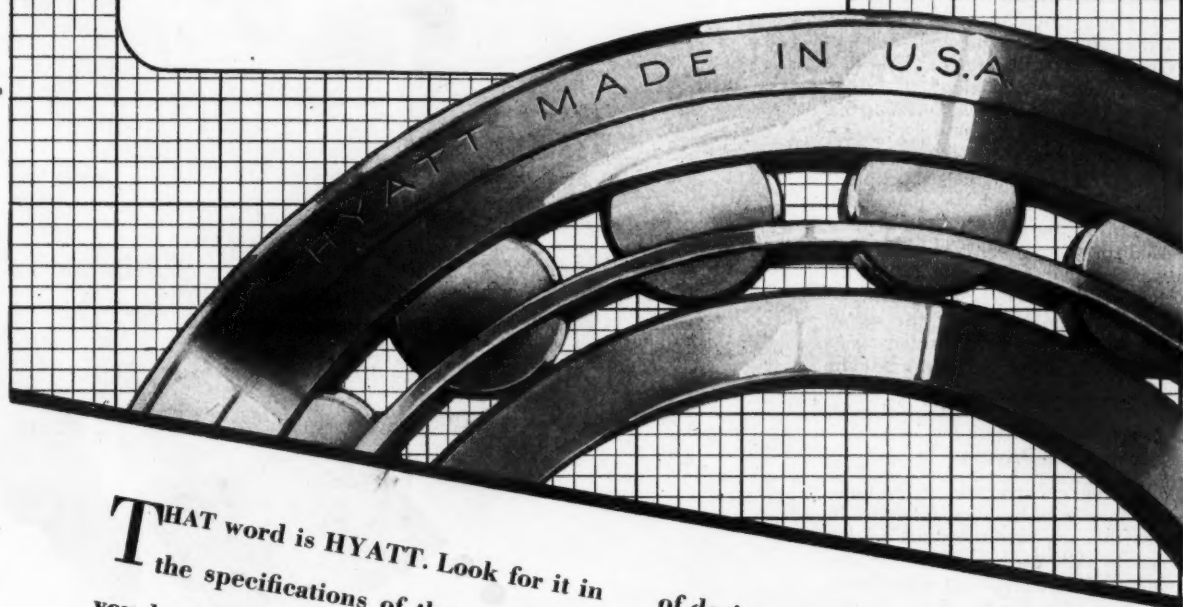
feet thick and 8 feet wide. Slots are made in the footings on 8-foot centers to receive 8-inch WF 31-pound steel

beams. These vertical members are braced by a diagonal kicker or strut, consisting of two 5 x 3½ x ¾-inch

angles back to back, 8 feet 10⅞ inches long, running to the rear of the footing.

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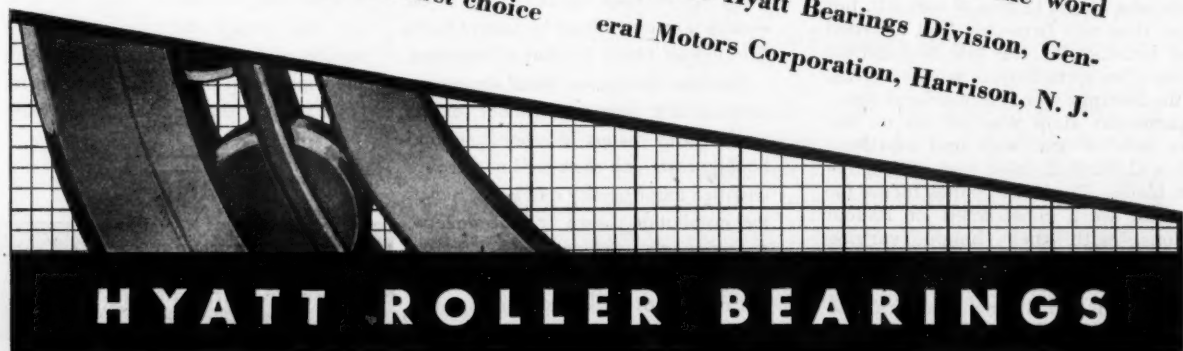
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Concrete Floodwalls Are Built Along River

(Continued from preceding page)

The ties are fitted into the slots formed by the steel beams, and are built up to elevation 13.0, the top of the wall. The parts for these stop-log supports are all interchangeable, and are stored near by where they can be reached in a hurry.

New Drainage System

Many of the city's storm sewers were intercepted by the sheet piling in the new wall, as the street laterals drained into the river. So, right behind the wall, a new sewer line was constructed, which varied in size from a 24-inch concrete pipe at the upper end to a 4 x 4-foot concrete box-culvert structure at the south end. And the existing street laterals were hooked up to the new line. (During wall construction they continued to discharge through temporary openings provided in the sheet piles. These openings were later closed when the laterals had been permanently connected to the sewer.)

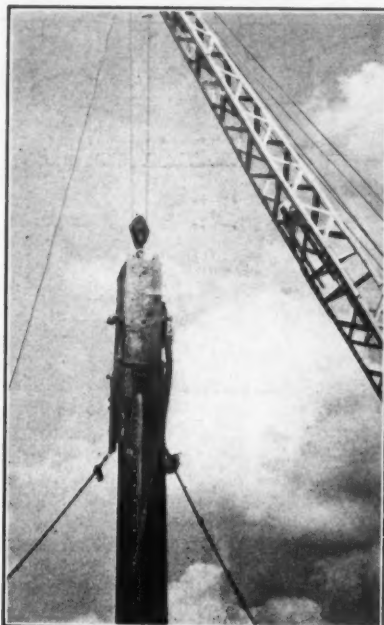
Storm water now goes through the wall via a sluice box equipped with Armco Hardesty 42-inch gates. One gate is used for gravity flow when the river is low. The other will be employed during high-water stages of the river. Then the water will be forced out under pressure of two 7,800-gpm pumps driven by 50-hp electric motors. One pump will be used until the rising water overtakes it, at which time the second pump will kick in to help.

During the construction, excavation for the footing began at the railroad bridge at the south end of the job and proceeded northward. A 1-yard Bucyrus-Erie dragline with a 50-foot boom dug the trench through a layer of oyster shells 4 feet thick. This deposit had accumulated along the river bank over the years as waste from the commercial oyster-packing houses which at one time lined the docks. Part of the excavation was stockpiled along the river side where space permitted; but as the narrow strip of land was used for many other purposes, this area was limited. Residents of the city also desired the oyster shells as fill, so the contractor sold most of the excavated material which was hauled away in trucks. Later, for backfill, he bought a borrow pit outside of the city limits and trucked the dirt in to the job site.

Pile Driving

Pile driving, construction of the footing, and then wall building followed in order, with each operation 300 to 400 feet apart. All the materials for the job were delivered by rail directly to the site alongside the Southern Pacific spur track. The steel sheeting came from the Tennessee Coal, Iron & Railroad Co. of Birmingham, Ala., and the treated-timber piling was supplied by Frerichs Lumber Co. of New Orleans, La. Driving was done by a McKiernan-Terry No. 9 hammer, with steam furnished by a portable boiler pulled along on skids. The hammer worked in 45-foot timber leads reinforced with steel channels, and swung from the 50-foot boom of the Bucyrus-Erie crane.

Beneath the 4-foot layer of oyster shells was about 12 feet of soft silt, but under that was firm clay that afforded good bearing for the pile foundation. As the piles were driven, wooden forms for the footings were built around them. A carpenter shop was set up on the river side of the wall and equipped with a C. H. & E. table saw with a 12-inch blade. There the panel forms for the wall were constructed in 10-foot sections, with their height varying from 8 to 11 feet. Tongue-and-groove 3/4-inch stock was used, backed with 2 x 6 studs on 16-inch centers and double 2 x 6 wales on 3-foot centers.



U. S. Engineers Photo
The McKiernan-Terry No. 7 hammer, left, used to drive foundation piling for the Berwick floodwall. At right: the template Hendry Corp. used in the driving operations.

The opposite panels were held together with Richmond Tyscrus on 3-foot centers both ways.

The reinforcing steel for the walls was supplied by Joseph H. Fox & Co. of Birmingham, Ala. The sides of the forms were coated with oil prior to a pour. The wall was constructed in 40-foot average monolith sections, separated by a 1/2-inch premolded asphalt-impregnated expansion joint. A copper water stop prevents water from running through joints during high water.

Batch Plant

A central batch plant for concrete operations was set up at the south end of the project in the corner between the railroad embankment and the line of the wall. Sand and gravel, obtained from the Holloway Gravel Co. of Baton Rouge, La., was shipped to the plant by rail. There it was unloaded and stockpiled by a P&H crane equipped with a 35-foot boom and a 5/8-yard clamshell bucket. The crane also charged the

(Continued on next page)

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ARMCO DRAINAGE PRODUCTS

Winslow 22½-ton weigh batcher which had one of its two compartments loaded with 15 tons of gravel, and the other with 7½ tons of sand.

Air-entraining bag cement, inter-ground at the mill, was supplied by Lone Star of New Orleans. On this contract the Government paid for the cement actually used, in addition to the unit price that was bid for concrete. The usual procedure on the wall pours was to batch the sand and gravel into a dump truck, add the cement by hand, and then dump the ingredients into a Jaeger 16-S mixer which operated near the wall section being poured. Water was supplied from the city hydrants through a hose.

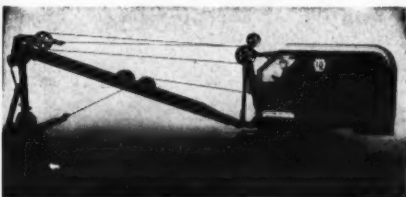
Concrete Operations

After the batch was mixed, it was discharged into a 1-yard concrete bucket which was then picked up by either of the two cranes on the job and emptied over the forms. Only ½ yard of concrete was placed in the bucket at a time. The wall forms were narrow, only 12 inches at the top, and with the reinforcing steel the clearance was reduced to 7 inches. Four receiving hoppers for the concrete were placed along the monolith form with 5½ x 10-inch boxes for downspouts. The concrete was deposited in 18-inch lifts, and vibrated by a Jackson vibrator as it was placed. After 48 hours, when the forms were removed, the concrete surfaces of the wall were sprayed with Tru-Cure curing compound.

The weights of a typical 3-bag batch of concrete were as follows:

Cement	282 lbs.
Sand	584 lbs.
Gravel	994 lbs.
Water	137 lbs.

The sand was graded from No. 4 down to a minimum of 1½ per cent passing the No. 100 sieve, while the gravel ranged from No. 4 up to a maximum of 1-inch coarse aggregate. The mix proportions were 1 : 2.07 : 3.53, with 5½ gallons of water to the sack of cement. In the wall pours 5¾ bags of cement were required for one cubic yard of concrete. The concrete contained an average of 4.7 per cent air, and had an average slump of 3¼ inches.



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Around the completed wall the back-fill was compacted by Ingersoll-Rand pneumatic tampers driven by a Worthington 110-cfm air compressor. The tamping was done in 4-inch layers up above the top of the storm sewer. Above that level, the compaction was achieved in 12-inch layers with a Caterpillar D4 tractor.

On the land side, the strip of land between the wall and the pavement of Front Street was paved with a 6-inch slab of reinforced concrete. This varied in width from 10 to 20 feet. Steel forms were used, and the concrete was screeded by hand. Manholes in the pavement collected the street drainage, and conducted the water to the main sewer.

A Wagner Scoopmobile rolling along on three rubber-tired wheels was used to good advantage in this operation. During paving, the mixer was set up near the batch plant since there was little room for it to work in the city street alongside the wall. The concrete was discharged into the hopper of the Scoopmobile which quickly ran to the

forms and deposited its load. The rig also had a 35-foot tower by which it loaded the batch plant when the crane was otherwise engaged. It was also used on the wall pours at times, instead of the crane and bucket.

On top of the wall highway-type lighting standards 10 feet high have been placed on 75-foot centers.

Quantities and Personnel

The major items in the Keller Construction Corp. contract included:

Excavation	10,000 cu. yds.
Backfill	3,500 cu. yds.
Treated-timber piling	22,000 lin. ft.
Steel sheet piling	38,000 sq. ft.
Concrete	3,800 cu. yds.
Reinforcing steel	280,000 lbs.
Concrete sewer pipe, 24 and 27-inch	900 lin. ft.

Two different Superintendents, R. G. Scarborough and D. D. Cottingham, directed a crew averaging 100 men employed by the contractor.

Berwick Floodwall

The 5,278-foot structure constructed at Berwick by the Hendry Corp. is a gravity-type reinforced-concrete wall.



C. & E. M. Photo
You are looking south along the completed Berwick, La., floodwall from End Street, at Gate No. 1.

A single line of sheet piling down the center of the wall supports it, and projects 2½ feet into the concrete. At the base the wall is 2 feet 2¼ inches
(Continued on next page)



Sometimes it pays to see double

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Concrete Floodwalls Are Built Along River

(Continued from preceding page)

wide, and the sides batter inward $\frac{3}{4}$ horizontal to 12 vertical to a width of 1 foot 3 inches just below the cap, which is 1 foot 7 inches wide x 1 foot 6 inches deep. The top of the wall is at elevation 13.0 and the height varies from 8 to 11 feet, depending on the topography of the ground. The wall was built inside a trench which was dug at least 3 feet below ground level. On the average, the bottom of the trench was at elevation 4.0, and had a 5-foot width with 1 on 1 side slopes.

The sheet piling was usually either MZ-32 or MZ-38 sections varying in length from 11 to 35 feet, depending on the substratum conditions encountered. On the right bank of the river the ground was usually clay, or clay and silt. The wall is about 300 feet back from the river to afford plenty of river frontage to industries which prefer being outside the wall. Many of these are firms engaged in the oil-exploration field. They have large stocks of durable materials such as pipe, which they would rather keep down near the river for ease in handling.

A 5-foot right-of-way on which to build the wall was sufficient, but a working easement of 25 feet was provided along the river side for construction purposes. This was necessary only at the upper end of the job. Through the main part of town along Bellevue Street, the wall was built on public domain. The wall has 12 openings—10 gaps for vehicular traffic, with widths of from 24 to 40 feet, and two gaps of 8 and 16 feet for pedestrians.

No large drainage problem was encountered on this side since the town had put in a new sewer system only the year before. Water mains, sub-



C. & E. M. Photo

Supervisory personnel on the Atchafalaya flood-protection projects included, left to right, Superintendent I. W. Halls of Hendry Corp., Resident Engineer H. W. Bryant, and Inspector Roy Wright.

marine cables, and other service lines went through either the sheet piling or the wall.

Pile Driving

The sheeting was obtained from the Carnegie-Illinois Steel Corp. of Muncie, Pa., and was delivered to the job by barge. After the trench was excavated by a Bucyrus-Erie dragline with a 45-foot boom and a $\frac{3}{4}$ -yard bucket, a template was set 4 feet above the bottom of the trench. This served as a guide for the sheeting, which was driven by a McKiernan-Terry No. 7 hammer powered by compressed air which was supplied by two Worthington 420-cfm compressors pumping to a receiver tank. The hammer was handled by either the Bucyrus-Erie crane or a Lorain crane with a 30-foot boom. No leads were used, but two piles were driven at a time by means of a fishplate attached to the hammer.

The overturning moment in the wall

was taken care of by welding a moment splice to the sheet piling, thereby transferring that stress down to the pile.

Rods 1 inch square and 3 feet long were welded on both sides of each pile section with a 6-inch solid-fillet weld. At the upper end they were tack-welded to the reinforcing steel. Welding was done with a couple of Hobart 300-amp electric welders.

Reinforcing steel was supplied by the Truscon Steel Co. of Youngstown, Ohio. It was set in place first, and then the wooden forms were set up around it. They consisted of $\frac{3}{4}$ -inch plywood sheeting backed by 3 x 6 studs on 16-inch centers, with double 3 x 6 wales on 3-foot centers. They were made up in 12-foot-long sections for the 35-foot monoliths, similar to the type of construction on the Morgan City side. Expansion joints and copper water stops are at each end of a monolith. The form panels were tied together with Richmond $\frac{3}{4}$ -inch anchors on 3-foot centers both ways.

Concrete Work

Near the south end of the job on a (Concluded on next page)

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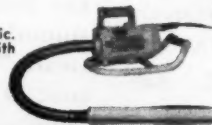
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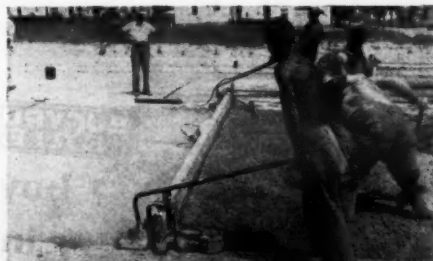
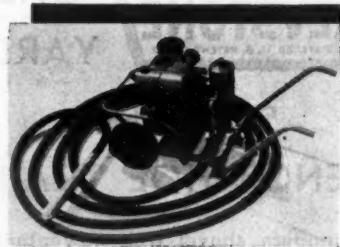
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siding of the Southern Pacific Railroad, a concrete batch plant was set up; it consisted of a Heltzel 40-ton aggregate bin with a 2-yard batcher and dial scales. Originally the bin had a capacity of 100 tons, but this full size was not necessary for the wall job so the upper plates were removed. Thus shortened in height the bin was filled easily by a Koehring crane with a 40-foot boom. The bin has three compartments but only two were used. Sand, gravel, and cement were obtained from the same sources as on the Morgan City job. The concrete mix proportions were 1 : 1.96 : 3.64. Cement content was 5.75 bags per cubic yard.

On the Berwick side the concrete was mixed in two Rex 3-yard Moto-Mixers mounted on Autocars. They backed under the batch plant and obtained the sand and gravel—also the cement, which was dumped into the drum by hand by emptying the bags over a hopper with a feeding sock at the bottom. Hydrant water was then added, and the ingredients were mixed from 1½ to 5 minutes, depending on the length of haul from the plant to the forms. The longest haul was less than a mile, and the average round trip for a truck-mixer was 20 minutes.

At the forms the concrete was discharged into a Blaw-Knox 1-yard concrete bucket. This was handled by either the Bucyrus-Erie crane with the 45-foot boom, or a Lorain crane with a 30-foot boom. The average monolith contains from 22 to 25 cubic yards of concrete, and Hendry Corp. poured up to four monoliths in a single 10-hour day. Forms were not removed for 48 hours. Curing was effected with burlap and water. Backfilling was done by the cranes, and the earth was leveled off and compacted by a Caterpillar RD7 tractor-dozzer.

Concrete operations on the Berwick side were on a larger scale than on the Morgan City wall, where there were separate pours for the footings and the wall piers. There was also less handling of materials on the Berwick contract, with the ingredients going from the batch plant directly to the truck-mixers, then to the concrete bucket, and next to the forms. On the Morgan City project the batch plant discharged the sand, gravel, and cement into a dump truck, which emptied the materials into the mixer skip. From there they went to the drum, then to the concrete bucket or the Scoopmobile, and finally to the forms. According to Corps of Engineers calculations, the loss of concrete on the Berwick job where 3-yard batches were used with the minimum of handling was from 2 to 2½ per cent. On the Morgan City side where only ½-yard batches were employed and where extra steps were taken in getting the concrete into the forms, the loss of material was around 10 per cent.

Quantities and Personnel

The major items included in the Hendry Corp. contract on the Berwick floodwall were as follows:

Excavation	6,000 cu. yds.
Backfill	5,000 cu. yds.
Sheet piling	105,000 sq. ft.
Concrete	3,300 cu. yds.
Reinforcing steel	317,000 lbs.

A force averaging 125 men was employed on the project under the direction at different times of Superintendents B. B. Stewart and I. W. Haile.

For the Corps of Engineers, Department of the Army, the project was supervised by the Morgan City Field Office which is headed by Henry K. Lee, Field Assistant. H. W. Bryant,

Resident Engineer, was in charge of the construction of both walls. Roy Wright and A. H. Davis were Inspectors. Col. John R. Hardin is District Engineer of the New Orleans District.

Help fight the scourge of infantile paralysis by contributing generously to the March of Dimes next month.

Santschi of Nordberg Retires

Jean Santschi, one of the pioneers in the diesel-engine industry, has retired as Manager of the Installation and Service Department of the Nordberg Mfg. Co. He will, however, still be available to Nordberg on a consulting basis. Matt Stromberg succeeds him.

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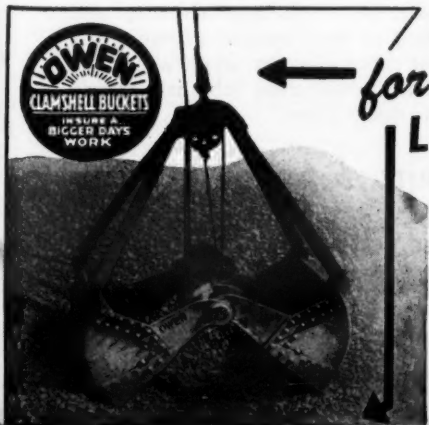
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Base Stone Crushed, Laid on 22-Mile Job

Two-Lane Highway Gets 10-Inch Limestone Base To Carry Heavy Traffic South of Kansas City

† ONE of the season's longest continuous highway flexible-base-course jobs in the midwest is a new 22-mile section between Garnett and Osawatimie in Kansas, on U. S. 169. There, at a cost of \$558,000 to the Kansas State Highway Commission, Contractor Harry Henery of Ottawa, Kans., laid crushed limestone for the new highway between those cities.

Started March 1 this year, the new highway base was scheduled for completion by the middle of July, and the surface course by September. Construction of the new highway will aid heavy traffic moving southwestward from Kansas City and is a part of current improvement on Kansas highways to bring roads in that state up to contemporary standards.

Henery's contract includes the production and laydown of a compacted 10-inch aggregate-binder base course, seal-coat treatment, and a 2½-inch bituminous mat over the flexible base. Approximately 250,000 cubic yards of crushed limestone was produced and laid.

New Highway Is Wide

The new roadway is 48 feet wide, with the base-course treatment cen-

tered over 26 feet of the road. The material tapers from the 26-foot width to a total width of 28 feet on the bottom.

Compacted earth shoulders, made of black organic material with a reasonably low plasticity index, will be built after the big rock-crushing and processing job.

The contractor's men and the engineers from the State Highway Commission assigned to the job are doing their best to make the road approach as nearly as possible the standards of higher-cost highways in other parts of the state.

Limestone Deposits

The new highway winds with gentle curves and long tangents through a rolling section of eastern Kansas, about 60 miles southwest of Kansas City. Outcrops of limestone approach the ground surface in many places. Kansas geologists have pegged the rock formations in that state so accurately that frequently they mention the rocks by name, in state specifications.

Predominant limestone ledges in this vicinity are known as the Iola and Wyandotte limestone formations, and Lane shale is found between them. All three appeared on the Henery job, all with certain peculiar characteristics.

Wyandotte limestone, for example, has been more exposed and impregnated with clay seams over the centuries than Iola limestone. By using



C. & E. M. Photo

International-drawn Insley wagons take crushed base-course material from the Cedarapids crusher at the south pit on the Henery contract.

a scalper screen between the primary and secondary crushers, most of this clay can be removed, however. Unless it is taken out, the material soon exceeds the allowable plasticity index of 2-8.

The blue shale, too, is not good. A small amount of this material will go a long way indeed towards scuttling the PI tests.

Two pit sites were tentatively (Continued on next page)



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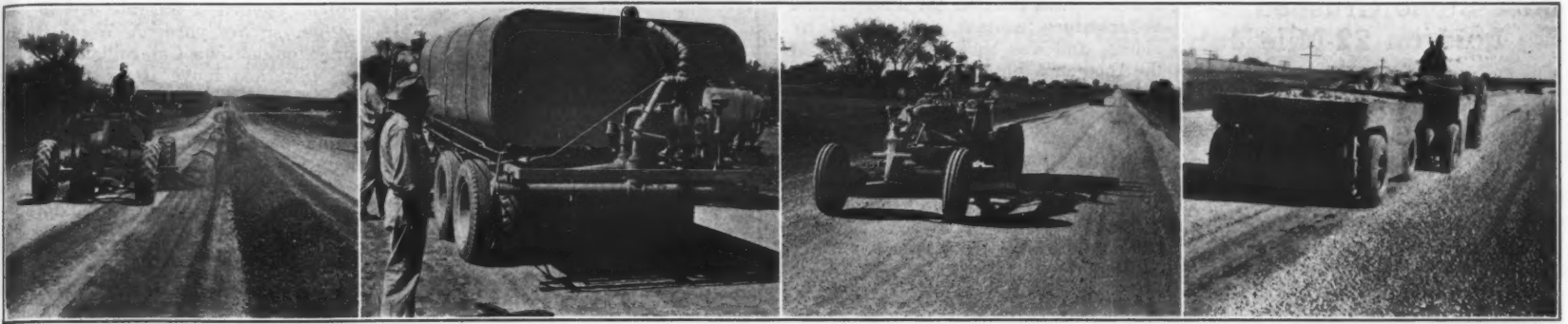
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C. & E. M. Photos

selected, and further tests were made when the contract was let. The pits selected for base production were located nicely in relation to the job. The southerly pit lay about ½ mile west of the highway, and about 6 miles from the south end. A crushing plant was set up there to produce rock for the southern half of the job.

At the north end, a favorable site was found practically adjoining the right-of-way limit lines. Another crushing plant was set up there, about 6 miles from the north end. This plant produced base-course material for the northerly section.

The entire 22 miles was barricaded to through traffic, only local automobiles being permitted to go through. Other traffic was detoured around U. S. 59, to the west.

Base-Course Specifications

State specifications for the base-course material were designed to produce the finest possible bearing value out of a 10-inch layer of crushed stone. The specification, known in Kansas as AB-3, called for the following sieve gradation of rock particles in the finished material:

Size Screen	Per Cent Retained
2-inch	0
1½-inch	0-5
¾-inch	5-30
No. 4	35-60
No. 10	45-70
No. 40	60-84
No. 200	80-92

The tolerances as to size were adhered to closely, and plasticity-index tests were run each day to keep that requirement well within the limits of the specifications.

Crushing-Plant Set-Ups

Henery, the prime contractor on the job, had an arrangement with Concrete Materials & Construction Co. of Cedar Rapids, Iowa, to buy the crushed material f.o.b. at the pits on a straight commercial production basis. Henery's machines hauled the materials; Concrete Materials equipment produced it.

Both crushing set-ups were similar, though the south plant was slightly larger than the north plant. Both were quite interesting.

About 3 feet of objectionable clay topsoil was first stripped off the top of each pit by a 12-yard LeTourneau Carryall and Caterpillar D-8 tractor. A P&H Model 655 shovel with two Dodge trucks also helped out. This material was dumped off to the side in a waste area.

A Chicago Pneumatic 500-cfm air compressor then moved in with two Gardner-Denver wagon drills, Timken steel, and Timken detachable rock bits. The longest length of steel used on the job was 24-foot, and the face was developed to this maximum depth as quickly as possible because both plants were shovel-fed direct.

Holes were drilled in a general grid pattern of 4 feet x 6 feet and not sprung. Hercules No. 2 Gelamite powder was loaded into the holes, and they were touched off by electric blasting caps. The formation was shot rather heavily to get the best possible breakage ahead of the crusher.

In the south pit, a P&H Model 655 shovel was brought in to load the broken rock. It scooped up dipper after dipper of the broken limestone and

dumped it directly to a Cedarapids feeder, which carried the material into a big Cedarapids 25 x 40 jaw crusher, with jaws set 6 inches apart.

Material from the primary crusher then passed across a scalping screen, which permitted all the dirt and other fines to drop through and leave the mixture. A conveyor carried this objectionable matter off to one of the Dodge trucks which hauled it to the

Careful laydown featured the 22-mile crushed-limestone base job on U. S. 169 in Kansas. At left, a Gallion motor grader operating in second gear blades the last of the material towards the center in the mixing operations. As the lifts were spread, GMC water tank trucks kept the material up to optimum moisture content (second photo). The Caterpillar No. 12 motor grader in the third picture is shaping one of the 3½-inch lifts. And in the last picture, two Bros pneumatic-roller units pulled by a Case tractor compact the top lift of the crushed sub-base.

waste dump.

The broken rock then went to a Cedarapids 40-inch hammermill driven by twin General Motors diesels both working on a single drive shaft.

Power was transmitted to the hammermill through a 9 V-belt drive. The hammermill was used to obtain the high percentage of fines required for (Continued on next page)

Relocating Part of U.S. Route 422



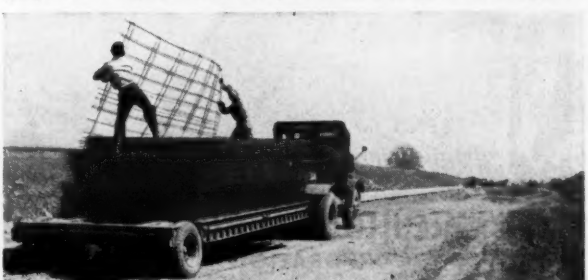
The dust flies as truck empties load into skip. To keep ahead of paving operations, newly arrived dowel units are unloaded from truck at right.



Scraper wagon and roller lead the parade as grading swings into high gear.



Placing Bethlehem Dowel Unit. For use either as expansion joint or contraction joint, this unit keeps dowels in near-perfect horizontal and vertical alignment.



Bethlehem Hinged Bar Mats, popular with road builders because of their remarkable ease of handling and installation, are shown being delivered to job.



Benjamin H. Fager (center), foreman for C. W. Good, Inc., with Wade D. Brandt (left), and M. H. Mosser, inspectors, Pa. Dept. of Highways.

To cope with fast-growing traffic conditions on Route 422, express highway from Philadelphia to Harrisburg, Pa., approximately five miles of relocation were authorized recently in the Robeson-Sinking Springs area. The new highway is three lanes in width, and includes five reinforced concrete bridges. The accompanying photographs show construction activity being carried out by C. W. Good, Inc., Lancaster, Pa. Reinforcing bars, structural steel, bar mats, dowel units and guard rail were supplied by Bethlehem.

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Base Stone Crushed, Laid on 22-Mile Job

(Continued from preceding page)

the job.

Crushed material from the hammer-mill then passed up a conveyor to a pair of surge bins, or went directly from another conveyor to Henery's fleet of hauling trucks.

Many of the conveyors around the plant used electric motors for their power. One of the features of the set-up was an independent Murphy-diesel-engine-driven E-M 125-kw generator, which traveled along with the plant and supplied the power. This unit was mounted on a frame and rubber tires.

Output of this plant was about 120 to 150 tons an hour. In order to produce crushed stone at the high rate of speed demanded for a job this large, both crushing plants worked 20 hours per day, in two 10-hour shifts.

The north plant was very similar to the other, except that its Cedarapids hammermill was slightly smaller, and its feeder hopper was fed by two 3/4-yard shovels, one a Koehring 205, the other a P&H. Drilling and shooting equipment were the same at both plants. The mobility and high output of these plants accounted for a steady stream of crushed rock out to the job.

Laying the Base Course

In fact, the output of crushed rock was so high that Henery at one time used 24 Insley bottom-dump wagons, of 12-yard capacity, drawn by International tractor-trucks. As fast as these machines could be loaded to shuttle off to the job, the crusher was ready for more.

Laying the material followed certain well defined steps, and the job was so handled that field operations took care largely of many inequalities of material at the plant. Also, the serious problem of segregation of large rock particles was solved by laying the material down in the following steps:

1. Sections of various lengths, generally around 1,000 feet, were blade-graded and prepared for the crushed-rock base course. Each 10-inch section was laid down in three lifts 3 1/2 inches deep compacted. In order to take care of inequalities of gradation, plasticity index, and so on, each lift was further divided into three dumps.

2. The hauling wagons came through and dumped one third of the first lift about 15 feet from the edge of the roadway, well within the base-course limits. A motor grader followed the wagons, throwing the material up in a peaked windrow. Its volume at this time was 17.3 tons per station.

3. The second part of the first windrow was then dumped, and the motor grader threw this material over into the first windrow. This operation increased the volume of the windrow to 34.6 tons per station.

4. A third dumping pass was made to bring the content of the windrow up to 52.3 tons per station, and the material was shoved over into the windrow by the motor grader. At this point all the material was in the windrow which was required for the first 3 1/2 inches of the granular base course.

5. Mixing of this windrow then began. A Caterpillar No. 12 motor grader and a Galion machine were used on one end and two Caterpillars on the southern part of the job. The two graders cut the material, rolled it across the road to the far side, and brought it back to the center. All during this operation, six special GMC six-wheel-drive trucks fitted with 2,000-gallon water tanks added water up to 10 per cent. Gorman-Rupp 2-inch pumps, driven by Briggs & Stratton gasoline engines, carried the water under pressure to the spray bars. The trucks hauled water from various pumping points where streams crossed the highway. When this

operation was finished, the material had its moisture content, was mixed by blades, and was back in the center of the road in a big windrow.

6. The two motor graders then cut into the center of the windrow, one machine blading the rock towards one edge, the other machine carrying rock towards the opposite edge. In order to prevent segregation, the mixed material was sent as straight as possible where it was destined with a minimum of blade work. Slightly more rock than was needed was carried out to the sub-base limit lines, and the excess material was later brought back to be left in the center of the road. This process effectively dispersed any loose or large rock particles.

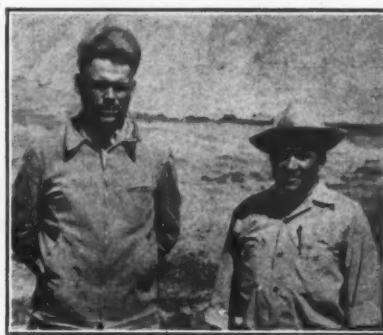
At the same time the machines were spreading this lift, water tank trucks passed through the section rapidly, keeping the material up to its optimum moisture content. Two Bros pneumatic-tire rollers, heavily ballasted and drawn by Case rubber-tired tractors, also worked in each section and rolled the material down as the motor graders were spreading it.

7. With the lift thus spread to line and shaped, extensive pneumatic rolling and light sprinkling followed, until tests showed that the stone was compacted to a minimum of 90 per cent of its original density in place. Any soft spots which developed in this process were usually caused by too much moisture; if they were bad, they were treated by aerating. Occasionally some segregation also showed up at this stage, and the trouble was corrected by re-mixing short sections to improve the condition.

When this step was finished, the first 3 1/2 inches was down tight, with a few occasional large rock particles on the surface.

8. Smooth-wheel rolling then followed, to mash these rock particles down in the body of the lift, and to smooth the surface as well as possible. An Oliver tractor was used to pull each steel roller; the roller units were made with ballast boxes fore and aft so that weight could be added where it was needed.

This treatment completed the first third of the lift. The entire process was then repeated two more times to get the full 10-inch thickness. In general, about a week of traffic and light sprinkling was allowed to cure each lift before



C. & E. M. Photo

Personnel on the Kansas base-course job included (left to right) Crusher Foreman Millard Blake, and Assistant Resident Engineer Water M. Naylor.

other material was placed.

Sealing and Traffic Course

When this job was visited, no seal treatment or travel mat had been laid. However, the plans were virtually complete as to methods to be used.

The compacted aggregate-binder base course will first be sealed with MC-1

asphalt, applied at the rate of 0.35 gallon per square yard. A Wood Road-mixer, pulled by a Caterpillar D8 tractor, will then move in as the Insley wagons again dump the material for the traffic mat. This aggregate will be mixed in the Wood machine with SC-3 asphalt, aerated by the motor graders, laid down in about the same manner as base-course material, and rolled thoroughly. A light surface seal coat will complete the job.

Personnel

The project was designed and is being administered under the supervision of R. C. Keeling, State Highway Engineer, with H. O. Reed as Construction Engineer. David Reese is the Senior Resident Engineer on the job, assisted by Walter M. Naylor. The project is in the Chanute Division. W. E. Allison is Division Engineer and C. G. Gates is Assistant Division Engineer.

For the contractors, Pat Schroll is in charge as General Superintendent. He has built many a mile of highway. (Concluded on next page)

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Millard Blake was in charge of crushing-plant operations at the south end, and Glen Coverdell held down the same spot on the north end. When the big job is finished, each man will have accounted for about 11 miles of highway, and Pat Schroll will have worried over the laydown work on all of it.

Investigation Under Way On Reinforced Concrete

A council has been created to carry out studies and experimental research in reinforced concrete, under sponsorship of the Engineering Foundation, 29 W. 39th St., New York 18, N. Y. The purpose of the investigation is to formulate a workable scientific theory for the design of concrete structures and a code in keeping with the findings of the experiments. The research is being undertaken with the approval of The American Society of Civil Engineers, one of the four engineering societies that established the Foundation.

Dr. A. B. Kinzel, Chairman of the Foundation's Board, pointed out that in working with concrete, the engineer is dealing with a material in which deformation is not proportional to stress. In the past, concrete and steel have been combined and the design has been based on the incorrect assumption that the strain in the concrete is, as in steel, proportional to the stress. Dr. Kinzel anticipates that as a result of the council's work, the use of reinforced concrete will be permitted in longer-span structures than is now considered possible, and that much of the uncertainty in design will be eliminated.

"Until recently the methods used for the design of reinforced concrete were essentially empirical," Dr. Kinzel continued. "On the basis of results obtained from an extensive set of tests conducted by the University of Illinois and Lehigh University, rational procedures have been established for the design of centrally loaded reinforced-concrete columns. These tests demonstrated the inadequacy of the old theory."

Two investigations have been recommended by the ASCE committee for immediate consideration by the council. The first is to be carried on at Ohio State University, and its purpose is to determine the shape of the stress block in reinforced concrete in the compression zone by means of photoelastic methods. This proposed study is a continuation of pilot tests which have already been made at the University.

The second investigation is to be conducted by Professor Richart and associates at the University of Illinois. It will be concerned with reinforced-concrete members subject to combined bending and direct stress. It is proposed to build and test 126 eccentrically loaded specimens with varying eccentricity ratios, varying percentages of steel, and for three different strengths of concrete.

Retarding Unit Governs Downhill Speed of Trucks

A device to control the downhill speed of trucks and truck-trailer combinations is described in literature prepared by The Parkersburg Rig & Reel Co. of Parkersburg, W. Va. The Hydrotarder operates on water supplied from the radiator through the regular cooling system and is said to be entirely independent of the mechanical brakes. It is controlled by means of a choke-type control rod mounted on the dashboard. By pulling out on this rod, the vehicle can be held at any desired speed without the use of brakes or the truck's transmission, the company explains.

Bulletin GAS-9-47 provides a general description of the Hydrotarder, pointing out its construction, method of installation, governing action, etc. Technical data and drawings cover design and

operation, and the ratio between horsepower and revolutions. There is a cross-sectional view of a typical unit, and an alignment chart based on a rolling resistance of 15 pounds per 1,000 pounds of gross weight. The bulletin is full of pictures of units on which the Hydrotarder has been mounted. The unit is also manufactured in models designed to control the speed of engines, dynamos, and other revolving machines.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 99.

R. W. Pointer Retires

R. W. Pointer, President of the Pointer-Willamette Co., Inc., has retired from active participation in the management. P-W will now be operated by a committee of four consisting of A. F. Muenchow, Comptroller; E. Burke Tongue, Materials Supervisor; G. D. Keerins, Manager, Trailer Division; and Phil Grabinski, Manager, Skyhook Division.

Pile Tips Increase Pile Bearing Value

Pile tips designed to increase bearing capacity and to provide easy starting and straight driving are distributed by Albert Pipe Supply Co., Inc., Berry and N. 13th Sts., Brooklyn 11, N. Y. According to the company, the inverted paraboloid shape of the Cobi pile tip causes the load to be centered and distributed over the full area of the diameter of the pile. This action, in turn, builds up under the pile a tightly consolidated pressure bulb which finally becomes a self-formed footing serving to anchor the pile.

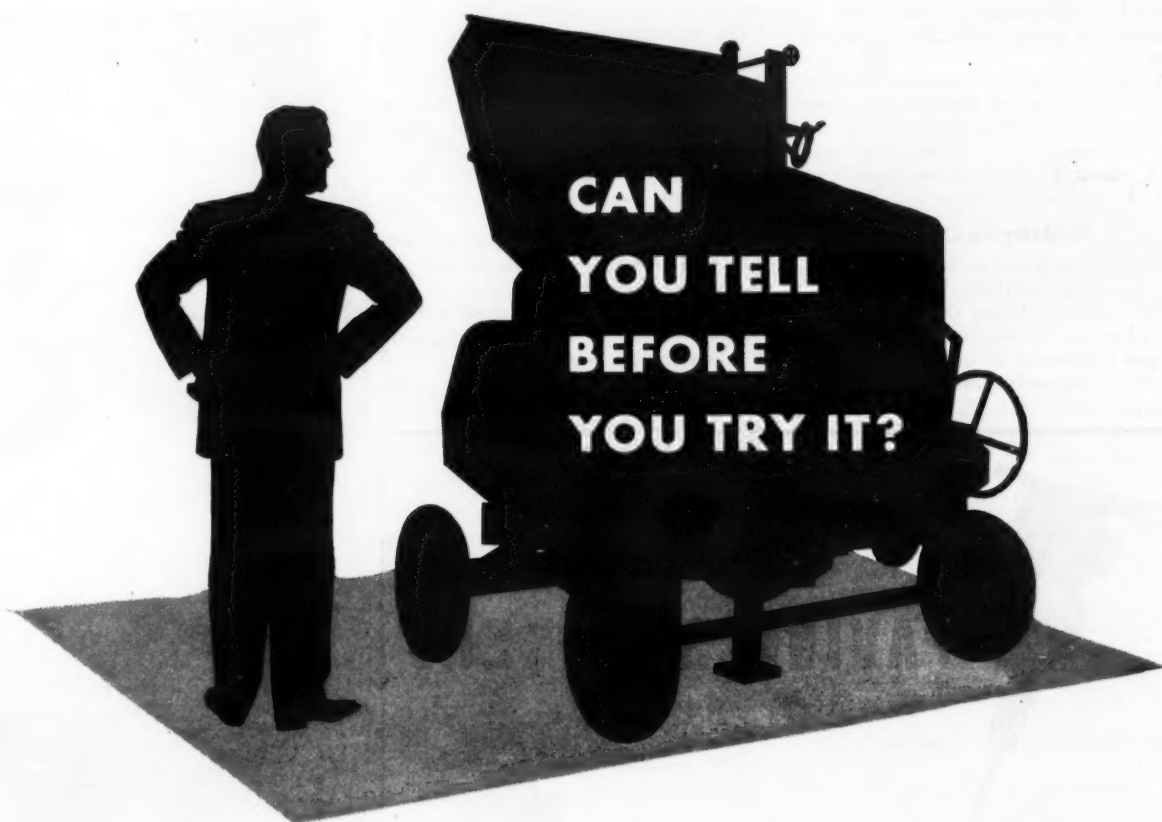
Cobi tips are manufactured in styles for several types of piling—timber, precast concrete, and cast-in-place steel piles. For cast-in-place or precast piles, the tips are available in 8, 10, 12, 14, 16, 18, or 20-inch sizes. They are made from forged or cast steel. Tips for timber piles are made from malleable iron in 6, 7, and 8-inch sizes, and they are furnished with a welded-on collar.



A Caterpillar diesel No. 12 motor grader shapes a road bank near Port Gibson, Miss. The No. 12 is owned by Hyde Construction Co. of Jackson, Miss.

Other sizes of Cobi tips are available on special order.

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Jackson, Mich.



Rock-Filled Crib In Big Breakwater

(Continued from page 2)

and one 12-inch timber. Other bolt lengths were 23, 35, 37, and 39 inches, all 1-inch round steel material.

Douglas fir timber was shipped in from the west coast, and unloaded at the work site. Construction of cribs proceeded without any special problems, on launching ways which would later let the cribs slide into Lake Superior. Lombard power air saws and Chicago Pneumatic impact wrenches and drills powered by Chicago Pneumatic air compressors simplified and shortened the work a great deal from the old days, when careful dapping and hand fitting were required for such a job.

The cribs were completed to a point about 12 inches above the line of low-water datum, and the 48-inch ice-guard plates were installed. Later, after the cribs were sunk, there would be time to install rock ballast and complete the side walls. The upright timbers were also left slightly long, so they could be trimmed to grade when the cribs had been set.

As the cribs were finished at the dock, they were launched in the cold green water of the slip after the ice break-up. The cribs sank down in the water and drew about 17 feet in the tow from Duluth to Two Harbors.

Sinking the Crib

Extreme care had to be used in sinking the cribs, particularly the first in-shore section. Unless this section was set exact as to alignment and grade, proper alignment of the other sections would be impossible. Specifications pro-

vided a tolerance of 3 inches on alignment, 4 inches in vertical height, and 3 inches between cribs. But the men in the field realized fully that accurate alignment of the first section to even closer tolerances than specifications permitted was the key to efficiency later on.

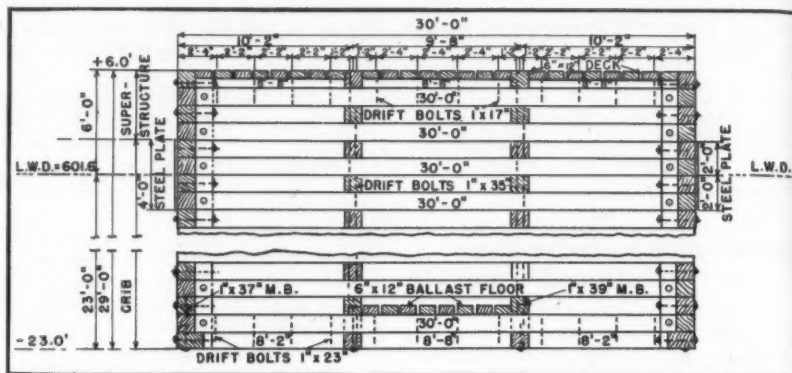
Accordingly, the dipper dredge No. 27 was towed to Two Harbors, and jockeyed around until the edge of its hull was about 1½ inches from exact alignment of the harbor face of the crib. The anchor and walking spuds were then jammed down hard on the bottom, and the dipper of the dredge was lowered on the harbor floor to increase her stability.

The crib was then floated in alongside the dredge, made fast to lines which could be slackened as the crib went down, and spotted exactly on position as to stationing in the structure. This position was carefully measured, and the side of the crib was checked with a transit. A derrick boat with about 35 skips full of rock then came in alongside, and a dump scow filled with fine filler rock was made fast to the derrick boat.

The first crib had been in the water for some time, and the timbers had started to waterlog. Therefore it did not require quite as much ballast as subsequent cribs to sink, and about 150 tons placed evenly in the ballast compartment weighted the crib down to a point about 40 inches from its resting place.

At this point the position of the crib was again carefully checked and adjusted. Twelve skips of rock, each holding about 8 tons, were then spotted around on top of the crib, weighting it down to the bottom.

Fine leveling-course stone was then



Cross section of timber crib for the Two Harbors breakwater in Minnesota.

clammed out of the dump scow by the derrick boat, and dumped all along the open bottom compartments on the outside of the ballast compartment. This filled up any low places underneath the supporting timber, and helped to stabilize the crib. Additional ballast was then unloaded in the ballast compartment until it reached a point near the

top of the water.

Subsequent cribs could then be placed without the aid of the dredge. They were brought in endo and made fast to the previous crib with blocks and cable. A hydraulic jack was placed at each side on the end of the first crib, to be used in moving the outer

(Concluded on next page)



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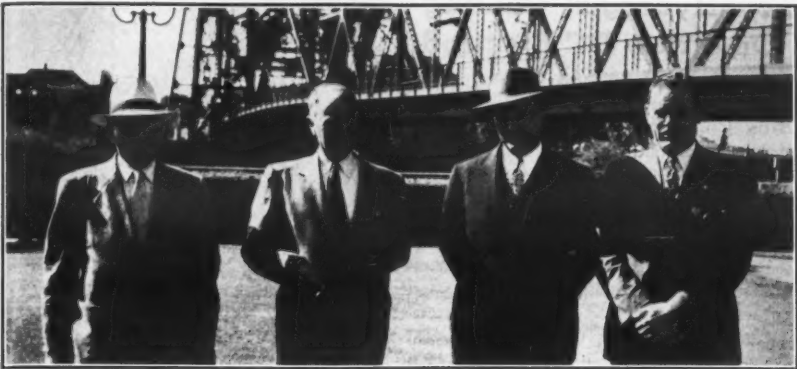
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C. & E. M. Photo

Supervisory personnel on the Two Harbors breakwater job included, left to right, John Carlson, General Superintendent for Zenith Dredge Co.; Col. D. A. Morris, District Engineer, USED, Duluth District; Don MacDonald, President of Zenith Dredge Co.; and E. R. "Ernie" Gustafson, Chief, Operations Division, USED, Duluth District.

end of the crib to its proper alignment. Ordinarily these jacks were not used until the initial ballast had been placed and the crib was about 40 inches from the bottom.

It is interesting to note that the first four cribs were placed within 1½ inches of alignment and grade.

After the cribs were sunk, the derrick boats got busy placing the heavy cover stones up over the rubble mound and around the crib bases. About the same time, a waterfront crew from the J. D. Harrold organization moved out with saws, wrenches, and other compressed-air tools to finish the timber sides and deck of the structure. Before the deck was placed, of course, the inner ballast was all completed, both in the ballast and in the open compartments.

Demolition of Breakwater

Specifications called for demolition of the old breakwater, which had previously been capped with reinforced concrete. Its rock was to be used in the rubble mound of the new structure.

Two Ingersoll-Rand 55-pound Jackhammers were brought in with short steel and detachable Carset bits. Holes went down about 5 feet apart, with little difficulty from intercepted steel reinforcement. When the project was visited, no shooting had been done. But it was planned to load the holes to the top with 40 per cent gelatin, tamp in light stemming, and shoot one 25-foot block at a time with electric blasting caps.

Grapple Work

For the cover stone above water line

and some of the cover stones under water above the toe stone, a new Owen Size 90 four-prong rock grapple was used with excellent success. Weighing 8 tons, this grapple easily handled the

largest quarried stone brought to the job, and held it quite securely until it could be fitted in. The finished job was so workmanlike that the cover stones resembled a hand-hewn job, according to the diver who viewed them. The cover stone above the water line speaks for itself.

Throughout the job, thus far, there has been the kind of fine cooperation that is worthy of comment. Zenith's work is under the field direction of Swedish born John "Cap" Carlson, veteran dredge skipper and waterfront man. Corps of Engineers activities come under the scrutiny of big, genial E. R. "Ernie" Gustafson. These two men call each other "Yawn" and "Ernie", and sometimes other names not in good taste to print, and have a unique way of working out their mutual problems.

The whole job is also under the overall direction of President Don MacDonald of Zenith Dredge Co., and Colonel D. A. Morris, District Engineer for the Corps of Engineers. Colonel Morris

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Literature Upon Request

CUMMER TWO-FIRE DRYER and 40-TON BIN UNIT

PHOTO BELOW SHOWS TYPICAL INSTALLATION
60 tons per hour capacity—located at Fall River, Mass.

Completely equipped with dust collection unit discharging into boot of hot elevator. Plant is equipped with 3-compartment cold storage hopper and feeder for regulation of feed into the dryer. 4' x 10' vibrating screen, 40-ton bin, 1-ton mixer, dial scales complete with all motors and drives.

Boiler house contains boilers, all asphalt pumps, etc.

Plant owned by the Sherry Corporation, Fall River, Mass.

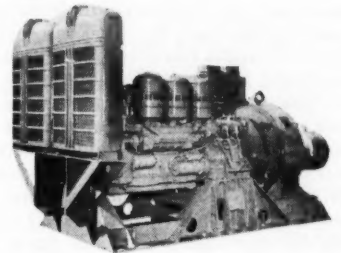
**THE F. D. CUMMER & SON
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BUILDER OF FINE ASPHALT
PLANTS
EAST 17th & EUCLID, CLEVELAND 15, O.

is the man who headed engineering development activities on bloody Iwo Jima from the time of its invasion until early in 1946, long after VJ Day. His work there included supervision of airfields, development of a water and gasoline fueling supply, and harbor work.

Work at Two Harbors is directed at field level by Zenith's Superintendent Mel Hotvedt, by L. E. Bowman and C. A. Kirts for J. D. Harrold, and by George "Push" Lewis for the Corps of Engineers.

When the big breakwater is finished, these men will have left a mark on the face of Nature at this north shore port that will endure long after their lifetime.

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150 KW twin diesel generating set, built by BFM for New York's new International Airport. Automatic starting within 15 seconds after power failure.

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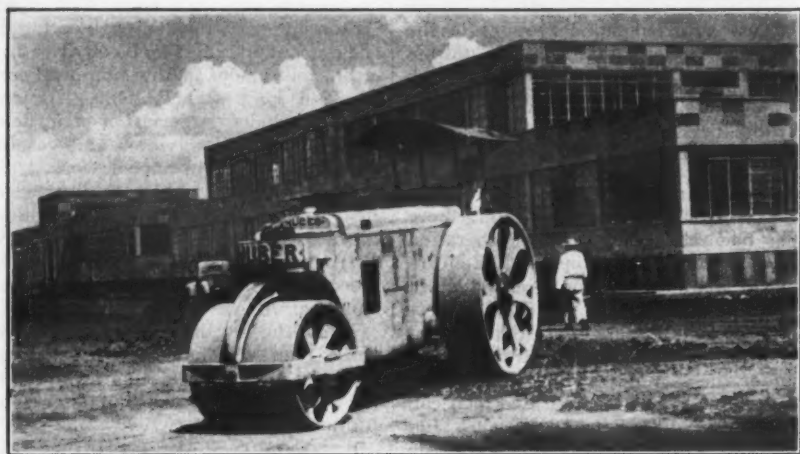
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See pages 98, 99

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470 Fourth Ave. New York 16, N. Y.



A Huber 10-ton 3-wheel roller works on the road and parking area of the Pemex Refinery now being built in Salamanca, Guanajuato, by Petroleo Mexicanos—the Mexican Government oil concern which controls all the country's oil. In the background is the Administration building of the refinery.

Prestressed Runway Needs Less Concrete

Recognizing that military and civil aircraft will become heavier and heavier, Eugene Freyssinet, a French engineer, has developed—at least experimentally—prestressed concrete runway pavements which are said to combine high structural qualities with relative thinness. His work is reported by the Airport Division of the American Road Builders' Association.

These pavements can carry loads fifteen times greater than concrete of the same thickness but of standard design and construction, M. Freyssinet claims. Or, said another way, a high-strength concrete pavement of this design and slightly less than 6½ inches thick has the equivalent strength of a standard 24-inch slab.

The developer of this type of runway also claims that present runways which are used by the heaviest planes are already stressed to their capacity, but that prestressed concrete runways could carry airplanes three times the weight of any which have yet been built. Moreover, M. Freyssinet asserts that a favorable factor of safety can be built into the prestressed pavements.

Essentially, the runway under study near Paris consists of a pavement slab in which a system of stressed high-strength cables is incorporated. Some of these cables are anchored to a series of deeply embedded concrete abutments placed 26 feet below the ends of the paved areas. A portion of the runway is reinforced longitudinally and transversely, using the same type of cable that is employed transversely in the pavement proper. The concrete is thus prestressed by the confining effect of the end abutments.

Prestressing is said to take place both longitudinally and transversely, even though the cables within the principal portion are placed only transversely. However, stressed cables are being placed both longitudinally and transversely in a minor portion of the runway described as the "border unit" of the abutments. Stressing which takes place in the cables is at least partially transferred to the concrete itself after it has set initially in such units. This portion of the runway parallels and is flush with adjoining pre-cast pavement slabs, and extends the full length of the prestressed portion of the runway. The border unit is 6 feet wide and of varying thickness. The pre-cast slabs, slightly less than 6½ inches thick, constitute the principal portion of the area.

In addition to the inclusion of a system of high-strength cables within the concrete section, the runway now under study was installed over a thoroughly consolidated foundation 14 inches thick, plus a 2-inch sand cushion. In addition, concrete beams underlie some of the longitudinal and transverse joints. The experimental pavement was pre-cast in blocks one meter square—ap-

proximately 1.20 square yards each. Prestressed cables which are installed transversely within the pavement area are placed between the joints of the blocks.

No cost data with respect to this development have yet been made available. But proponents of conventional concrete pavements point out that the relatively heavy foundation requirements, plus the intricate system of cables, the underlying concrete beams, and the deep and heavy abutments required, will offset to a substantial degree the savings which might be possible from drastically reducing slab thickness. In any event, developments in this field will be watched with interest—especially by designers of airports who are already confronted with the construction of runways up to 21 inches thick to support very heavy plane loads.

Low-Hydrogen Coating On a New DC Electrode

An electrode with a low-hydrogen coating is announced by The Hobart Bros. Co., Hobart Square, Troy, Ohio. It is recommended by the company for welding high-carbon, high-sulphur, and other hard-to-weld steels. According to the manufacturer, the special coating eliminates underbead cracking.

Physical properties of the electrode are: tensile strength, 94,000 psi; yield point, 85,000 psi; and 26-per cent elongation in 2 inches. It is said to have a smooth and steady arc—insuring good root penetration—and a deposited weld metal with a high ductility. The No. 90-PL is available in 3/32, 1/8, 5/32, 7/32, and 1/4-inch diameters for use with dc welders only.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 79.

Data on Rust Preventives

A catalog on Rust-Oleum rust-preventive products has been put out by the Rust-Oleum Corp., 2425 Oakton St., Evanston, Ill. These products are designed to protect all metal surfaces against rust. They can be applied directly to rusted surfaces without preliminary cleaning or preparation of the surface, the company points out.

The catalog discusses the way Rust-Oleum products work to prevent rust. It contains directions for their use and application, as well as 48 color cards which show the colors in which the Rust-Oleum paints are available, and color panels which show 22 standard colors used by manufacturers of machinery and equipment. Also included



"It's a rescue party. Two of their men are lost in the fog on the 67th floor."

is a section outlining recommendations for the use of Rust-Oleum on all building materials requiring a liquid sealer as a waterproofing agent, and for the use of five kinds of Rust-Oleum oils.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 37.

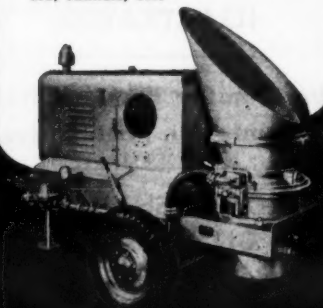
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Write for illustrated bulletin No. 5G-348 showing JETCRETE in action.
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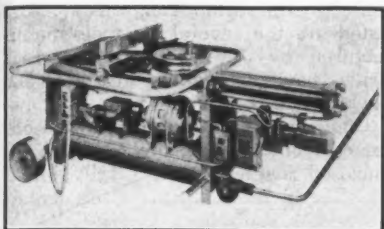


Superior SIDE BOOMS

If you have any sizable pipe-laying to do, look into the economy, speed and safety which are yours with this modern equipment.

Superior Side Booms come in four sizes—all mounted on International crawler tractors—sold and serviced by International dealers, everywhere. Write for additional information, specifications, to Dept. C-12.

Superior EQUIPMENT CO.
BUCYRUS, OHIO



This is the Wallace No. 1402 hydraulic ram-type bending machine. It is electrically driven and is designed to bend reinforcing bars or other metal objects up to 180 degrees in one operation.

Ram-Type Bar Bender

A portable ram-type hydraulic bar-bending machine is manufactured by the Wallace Supplies Mfg. Co., 1308 W. Diversey Parkway, Chicago 14, Ill. This electrically driven unit is said to bend reinforcing bars, or other metal objects, up to 180 degrees in one continuous operation. And, the manufacturer adds, once set, the duplicator stop will make any number of bends of exactly the same shape. The unit is push-button-controlled.

The Model No. 1402 bar bender requires a floor space of 3 feet 9 inches x 8 feet 4 inches. It will handle pipe up to 2 inches in diameter. Several dies are available for use with various sizes of square, flat or round objects. Die equipment for channels, I-beams, and T-bars can also be furnished on request.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 31.

Dewatering Points

Dewatering points for removing and controlling water in excavations are manufactured by Clayton Mark & Co., 1900 Dempster St., Evanston, Ill. These are available in two models: the No. 1500 which is jetted with an outside parallel water line or driven; and the No. 1510 which is jetted through a bottom valve and nozzle. Both points are furnished with 36-inch jackets, and longer jackets are available as desired.

The pipe fitted inside the No. 1500 point is designed to draw water from the bottom of the strainer to insure maximum depth after the water level has dropped below the top of the strainer jacket, and until it reaches the bottom of the inside suction pipe. The No. 1500 is available in two pipe sizes: the 1 1/4-inch size has a 3/4-inch inside suction pipe and a 1 1/4-inch connector at the top; the 2-inch size has a 1 1/4-inch inside suction pipe and a 1 1/4-inch top connector.

Points in the 1510 series are fitted with an inside suction pipe designed to draw water from the bottom of the strainer. This is said to insure maximum depth until the water level drops below the bottom of the inside suction pipe. The bottom nozzle is fitted with a spring-controlled check valve which opens under pressure to permit free flow through the points for jetting. It is designed to close automatically when the pressure is released. The No. 1510 has a 2-inch pipe size, a 1 1/4-inch inside suction pipe, and a 1 1/4-inch top connection.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 68.

Engines for Motor Trucks

Heavy-duty truck engines for operation on butane or gasoline are described in a catalog prepared by the Hall-Scott Motor Division of the ACF-Brill Motors Co., Berkeley 2, Calif. The catalog features photographs of the Hall-Scott Series 400 engines from 225 to 300 hp in use in several popular makes of motor trucks.

The catalog also contains two spreads showing the installation dimensions of the butane and gasoline engines. Specifi-

cations cover bore and stroke, weight, carburetion, tank capacities, lubrication system, crankshaft, and other internal features. Finally, several close-ups of the engines show their comparative sizes and the location of accessories.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 2.

Soil-Cement Processing

"Soil Cement Processing Methods" is the title of Bulletin No. 50 released by Seaman Motors, Inc., 305 N. 25th St., Milwaukee, Wis. Its purpose is to inform users of Seaman Pulvi-Mixers about the efficient use of the machines in processing soil-cement surfaces.

The bulletin describes the four-fold mixing action of this one-pass machine; depth control of hood runners and how it is achieved; features of the scarifier attachment; and operation and use of the spray bar. It describes a typical day's work with the Pulvi-Mixer, explaining preparatory work, pre-wetting,

pulverizing, and lane processing. It describes cement-spreading operations, compaction methods, subgrade treatments, and all other operations connected with this type of construction.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 60.

Concrete-Floor Patch

A new product for the high-speed repair of concrete floors and other broken, rough, or uneven concrete surfaces is announced by United Lab-

oratories, Inc., 16801 Euclid Ave., Cleveland 12, Ohio. According to the manufacturer, the Tampatch material is capable of withstanding heavy traffic loads.

Tampatch is delivered to the user already mixed, and can be kept on hand for application as needed. The repaired surface can be opened to traffic almost immediately, the manufacturer points out, and is smoothed out and compressed by traffic over the area.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 55.



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City, county and state highway departments use Hydro Spreaders because they provide the safe, sure way of spreading icy streets and roads. Easily installed on any dump truck with hydraulic hoist.

Material can be spread from 9 ft. to 35 ft. at speeds up to 30 m.p.h. All sprockets and chains are fully enclosed and material can be dumped over spreader without damage. One man can drive truck and operate spreader from cab.

An exclusive Hydro Spreader feature is the automatic gate opening device. When the driver starts the spreader the gates open and as the spreader is stopped the gates automatically close. There is no waste of material when spreader is not in operation. Hydraulic Spreaders are guaranteed to be free from defects in either materials or workmanship. Immediate delivery.

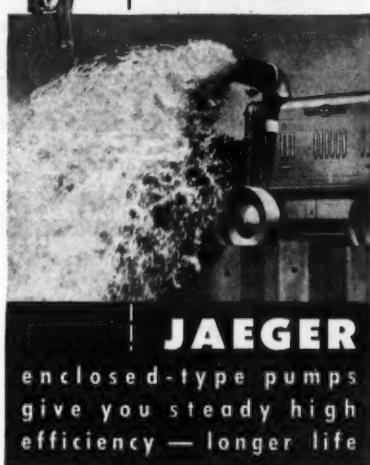
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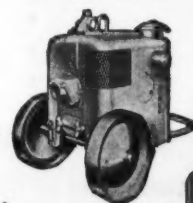
Hydro Spreader Corp. 247 Madison Street
Waukesha, Wisconsin

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to handle
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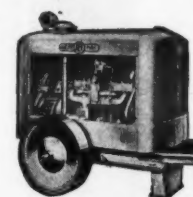
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Conservatively
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Compact, extra
powerful units of
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capacity.



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Super-Jet Pump:
Extremely com-
pact, yet out-
performs old,
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lbs.; 90 h.p.
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Only 30
seconds to prime
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Contractors and Fleet Operators of all
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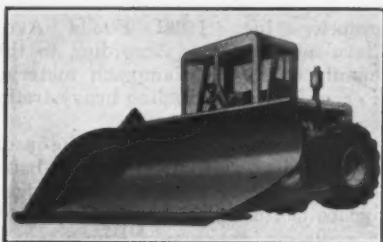
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Dependable holding power under
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Gatke **BRAKE LININGS**
BLOCKS SETS ROLLS SHEETS
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224 N. La Salle St., Chicago 1, Ill.



This is LeTourneau's new V-type snow plow designed for mounting on the Model C Tournadozer.

V-Style Snow Plow Fits 180-Hp Tractor

A snow plow for use with the Model C Tournadozer has been developed by R. G. LeTourneau, Inc., Peoria, Ill. In order to put traction and weight well up forward, the 180-hp Tournadozer fits into the V-section of the plow. The moldboards are shaped much like a soil plow, the manufacturer points out, so that snow is lifted from the ground and flows off the ends without packing. The outer ends of the moldboards are curved outward in order to slope the snow back and to keep it from falling into the road. The top of the blade is angled forward to prevent snow from drifting into the windshield of the Tournadozer.

Fast-acting cable-operated controls are designed to permit raising the plow up to 5½ feet for handling high-bank jobs. Three adjustable steel runner shoes permit the plow to be nosed up, nosed down, or adjusted for cutting height. A large divider plate is built into the nose of the plow to prevent snow from being plowed back into the road on widening jobs. Short coupling and ample weight on the four-wheel tandem drive are said to provide stability on high-speed work and to give extra ground-gripping traction for widening lanes.

Specifications for the snow plow include: width at cutting edges of moldboard, 12 feet 3 inches; size of the two cutting edges, ½ inch x 10 inches x 9 feet 3 inches; width at top of moldboard, 13 feet 7½ inches; height at front of the V, 4 feet 7½ inches; height at top of moldboard, 6 feet 4½ inches; thickness of moldboard, 3/16 inch; shoes, 8 x 14 inches; height the moldboard can be raised, 5 feet 6 inches; weight, with Tournadozer, 32,000 pounds.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 75.

Automotive Detergent

A liquid detergent designed as general-purpose cleaner for automotive equipment is announced by the Automotive & Aviation Service Division of the Detrex Corp., Box 501, Detroit 32,

Mich. It cleans dirt, grease, and grime quickly and thoroughly, says the company.

The detergent is marketed under the name of Drex-Foam, and is said to dry to a sparkling finish without streaks, smears, or harmful effects to the surfaces it is used on. It is mixed in a ratio of 1½ to 2 ounces of Drex-Foam to a gallon of water. The solution may be used either warm or cold. It is rinsed off by flushing with clean water. It can also be used for cleaning upholstery if it is worked up to a lather and sponged onto the fabric.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 71.

Electric-Plant Selection

A 20-page catalog listing the complete Onan line of electric plants, including many new models, is being distributed by D. W. Onan & Sons, Inc., 43 Royalston Ave. N., Minneapolis 5, Minn. Featured in Bulletin No. A-138-A is a model guide designed to assist in the right selection of electric plants for any need. This guide discusses the features of ac, dc, and battery-charging models. It tells how to choose the proper types, the right size, and the most desirable starting method for any type of service. General information also covers the wattage required by motors and several types of appliances.

Items illustrated and described in detail in the catalog include: air-cooled ac plants in capacities of 350 to 3,000 watts; water-cooled ac plants in wattages of 2,000 to 35,000; air-cooled battery-charging models in 6, 12, 32, and 110-volt sizes; air-cooled dc units in capacities of 750 to 5,000 watts; water-cooled dc units in capacities of 6,000 to 15,000 watts; and diesel electric plants in ac and dc models. Also listed are Onan accessories including wall-mount controls, fuel tanks and fuel lines, gas and gasoline carburetors, dollies and trailers, and remote stations and wire.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 45.

Portable Air Compressors

Portable air compressors in a wide range of styles and capacities are described in literature prepared by the Joy Mfg. Co., Oliver Bldg., Pittsburgh 22, Pa. Bulletin A-55 is 24 pages long, and describes the complete Series 80 line of trailer-mounted compressors.

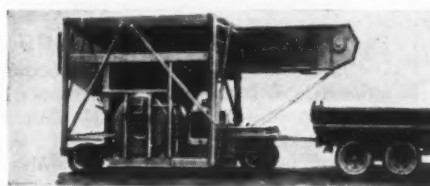
Features of the Joy units have been grouped under six headings—efficiency, portability, low maintenance, reliability, pride of ownership, and variety of mounting—with a double-page spread

devoted to each. Specifications covered in the catalog include power units, intercoolers, air cleaners and silencers, actual free air delivered, operating pressures, and so forth.

A table at the back of the book provides technical information on the average number of tools which can be op-

erated by the various compressors. Also listed are the several air tools manufactured by Joy—wagon drills, rock drills, paving breakers, drifters, and backfill tampers.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 30.



30* CU. YD.-HR PORTABLE CONCRETE PLANT

Write for Data



STRAYER Portable CONCRETE PLANTS

Eric Steel Construction Co., 2812 Geist Rd., Erie, Pa.

BUCKETS • AGGREGATES • PORTABLE CONCRETE PLANTS

CAPACITY OF PLANT

Up to 30 cu. yd./hr depending on mixing time.

CAPACITY OF MIXER

Full 3/4 cu. yd. with 10% sur-charge capacity.

CAPACITY OF BIN

20 Cu. Yd. heaped 3 equal compartments.

CAPACITY OF AGGREGATE

Full 3/4 cu. yd. with suspension type scale.

CAPACITY OF ELEVATOR

60 Tons/HR handling material weighing 100 lbs. per cu. ft.

OPERATING CONTROLS

All Mixer Bin and AggreMeter Gates hydraulically operated with control levers banked at operator's position.

* 40 Cu. Yd/HR Plant also available.



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CON-VAY-IT 12-20 CONCRETE SPECIAL

pours 2 yards of
WET CONCRETE
in about 3 minutes

Photo shows two American Conveyors in tandem doing this remarkable job for the A. V. Stackhouse Company, Contractors, of Indianapolis, Ind. Contract covered an addition to the Indianapolis Paper Container Co. where concrete was conveyed 35 ft. from truck to pouring point, with an elevation of 22 ft.



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AMERICAN CONVEYOR CO.
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Cableway Features 875-Foot-Bridge Job

(Continued from page 1)

placed at the edges of the bayou. They are close enough to the shore, however, so that they were built with land equipment.

Cofferdams of steel sheet piling, 35 feet long, were driven by a McKiernan-Terry 9B steam hammer handled by a stiffleg derrick. A vertical coal-burning boiler supplied the necessary steam. Two cofferdams were constructed for each pier, since the piers consist of two footings, supporting shafts which are connected by a web wall. For piers 2 and 3 the individual cofferdams measured 15 x 13 feet, while for piers 1 and 4 the cofferdams were 13½ x 11 feet. They were excavated with a clamshell bucket handled by the derrick, and strengthened against buckling by two rings of oak 12 x 12's on 4-foot vertical centers, with other 12 x 12's for cross-bracing. So well constructed were the cofferdams, that a single CMC 4-inch pump unwatered the structures and kept them dry while a hole for the footing foundation was drilled and blasted in the rock. The rock was mostly a shale, with some scatterings of harder material.

After the excavation was completed, the water was permitted to seep back into the cofferdam, and the concrete seal was poured to a thickness of 3 feet at piers 2 and 3, and 2 feet at piers 1 and 4. The seal was placed under water, with the derrick handling a concrete tremie bucket. Then the cofferdams were pumped dry and forms were built for the footing pours. On the two large piers the footings measure 15 x 12 x 8 feet deep, and on the smaller piers the footings are 12½ x 10 x 7 feet deep.

The shafts were built next with the use of steel forms. They are circular, with a 7-foot diameter at the bottom and 3-foot 4-inch diameter at the top, and are connected by a web wall 1½ feet thick. This is all surmounted by a coping and cap. Piers 2 and 3 are 58 feet high, while piers 1 and 4 are 54 feet high, measured from the bottom of footings to the top of caps which are 3½ feet deep and 29½ feet long.

The derrick, which played a major part in the pier construction, worked on rails, first from pier 2 to pier 1 on the south side of the job, and then from pier 3 to pier 4 on the north side. The concrete mixer was placed between each set of piers on opposite sides of the bayou, and concrete was discharged into a bucket which was swung over the forms by the derrick.

Job Materials

Sand and gravel for the fine and coarse aggregate in the concrete were supplied by the American Sand & Gravel Co. of Hattiesburg, Miss. They were delivered by rail to the Port Gibson siding of the Illinois Central Railroad. From there the material was hauled the short distance to the job site by truck. Bag cement also came by rail—Lehigh from Birmingham, Ala., and Lone Star from both Birmingham, Ala., and New Orleans, La. The Connor Steel Co. of Birmingham, Ala., furnished the reinforcing steel, delivering it to the job site by truck. Water for the concrete was tapped off a city main, and was also used in the curing to soak down the burlap coverings.

Steel girders for the cantilever spans were furnished by the Virginia Bridge Co. They were shipped by rail from the Memphis, Tenn., plant to the Illinois Central siding at Port Gibson, and trucked out to the job. Bethlehem Steel Co. of Chicago, Ill., fabricated the steel for the bents and superstructure of the approach spans. These members were supplied to the contractor by the Mississippi State Highway Department. They had been ordered some time prior to the award of the contract in order to

insure delivery and thus expedite the necessary construction.

Steel H-Beam Piling

The piers were completed by October, 1947. But while they were being built, the steel H-beam piles were being driven for the structural bents, under a subcontract by W. R. Fairchild & Sons of Hattiesburg, Miss. The 12-inch 53-pound H-beams, 60 feet long, were driven by a Vulcan No. 1 steam hammer working in a portable pile-driving rig equipped with a collapsible boiler carried on a trailer. They were driven without jetting. In the five-pile bents the inner three piles are plumb, while the outside piles are battered 1½ inch to the foot. The spacing at the top is 7 feet 4½ inches. The piles were driven from 2 to 3 inches into the rock, which amounted to refusal, and then cut off to grade by a torch. The steel piles were also supplied to the contractor by the State Highway Department.

At the ground the H-beams were encased in concrete 1 foot 2 inches



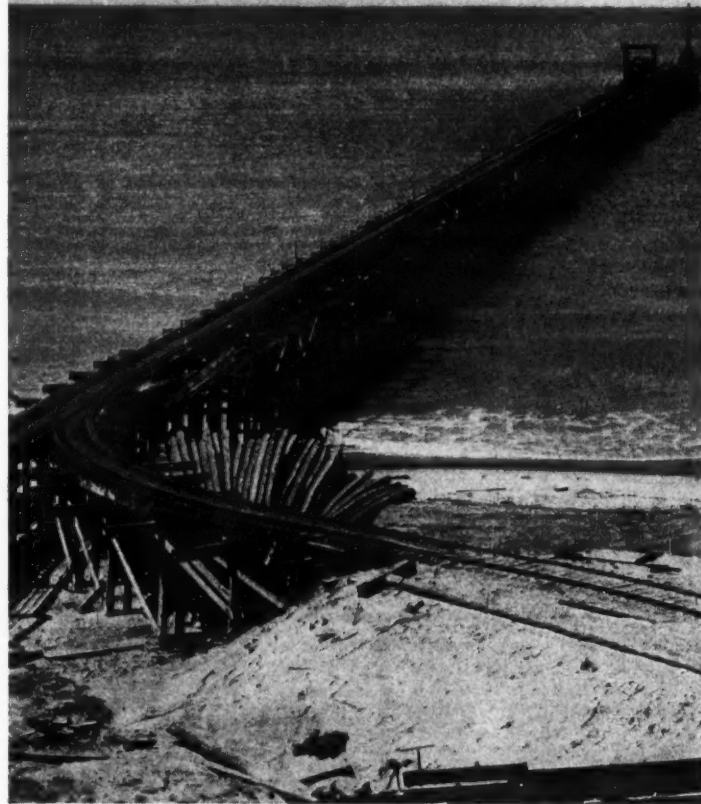
C. & E. M. Photo

Reinforced-concrete piers support the cantilever spans of the new Bayou Pierre bridge. The other spans rest on bents of five steel H-beams topped by a concrete cap, as you can see in this view looking south along the bridge.

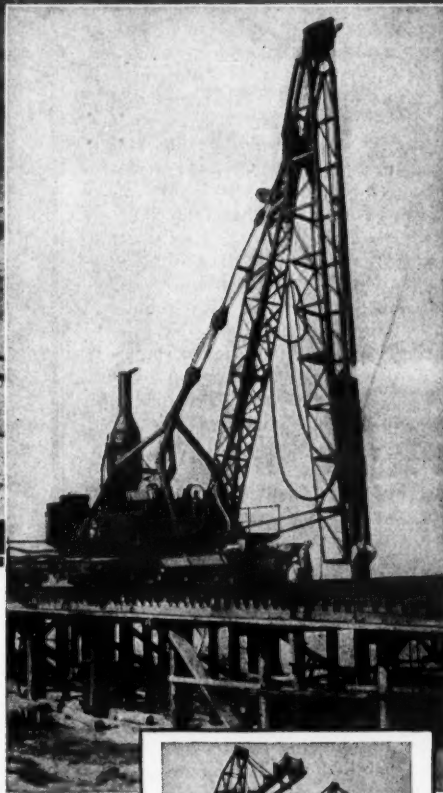
square for a length of 5½ feet, 2½ feet above and 3 feet below the surface. Wood forms were used for the pours, and the concrete was reinforced by

wire mesh. The piles were tied together in the bents with steel angles for sway bracing; and at the top, concrete caps (Concluded on next page)

Taking a Sewer to Sea



McKiernan-Terry No. 11-B-3 Double-Acting Pile Hammer, operated from a gradually lengthening work trestle, in the construction of the Hyperion submarine outfall sewer at El Segundo, Calif. Guy F. Atkinson Co., contractor.



This project—to deposit sewage in the ocean a mile out from shore—required driving both timber and steel H-beam piles. Past experience told the contractors that they could rely on a heavy-duty McKiernan-Terry Double-Acting Hammer for the necessary power and dependability.

The 11-B-3 Hammer shown here is one of 10 double-acting sizes in the McKiernan-Terry standard line, which includes also 5 sizes of single-acting hammers and 2 double-acting extractors . . . providing always a right choice for any specified driving or pulling requirements.

MX-260

WRITE FOR INFORMATION

We'll gladly send you McKiernan-Terry literature giving double-acting and single-acting hammer specifications for your files. Send today.

McKIERNAN-TERRY CORPORATION

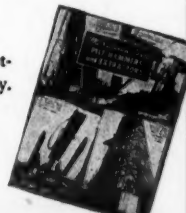
Manufacturing Engineers

19 PARK ROW, NEW YORK 7, N. Y.



Other McKiernan-Terry Activities

McKiernan-Terry quality and engineering excellence are also found in coal and ore bridges, bulk material unloaders, marine equipment and other large engineering structures performing important service to industry, railroads and our government.



McKiernan-Terry PILE HAMMERS AND EXTRACTORS

Cableway Features 875-Foot-Bridge Job

(Continued from preceding page)

were constructed. The caps are 32 feet 6 inches long x 2 feet 6 inches wide, and 2 feet 3 inches deep. The steel piles have a 1-foot penetration into the concrete caps.

Steel Superstructure

Steel erection began the middle of December, 1947, and was completed by mid-April, 1948. The heavy girders for the cantilever spans were set in place by either a Manitowoc Speedcrane with a 55-foot boom or a stiffleg derrick. The latter rig had a 28-foot mast and a 50-foot boom, and moved on rails set to a 13-foot gage. It was operated by an American three-drum hoist powered by a 45-hp coal-burning boiler.

The girders are 9 feet deep over the two water piers, and decrease to 6 feet at the center of the span and over the other piers.

For handling the lighter steel in the other spans the cableway was used. This consisted of two 85-foot steel towers, one on each bank of the bayou, 1,000 feet apart. Each tower was secured with three 325-foot guys—a 1½-inch guy on each side and a 2-inch guy to the rear. The guys connected to deadmen—36-inch oak logs buried deep in the ground. Between the towers were strung a 2½-inch carriage line, a double ¾-inch traction line, and a ¾-inch load line. A four-wheel carriage with a pick-up hook traveled on the carriage line. The cableway was operated by an American steam-driven three-drum hoist. The cableway was originally constructed by the Vincennes Steel Corp. of Vincennes, Ind., and was purchased from it by John H. Moon, the contractor. Mr. Moon had been a Superintendent for the steel company for the past 25 years, and this was his first job as contractor on his own.

The lighter steel members were delivered to the north end of the job where they were picked up by the cableway and moved out over the spans. Intermediate beams up to 5 tons in weight were thus easily handled. They were moved out to the proper span where they were first bolted in place and then riveted with ¾-inch rivets. A single riveting crew of four men—heater, catcher, bucker, and driver—did all the riveting with Chicago Pneumatic hammers powered by a CP 105-cfm air compressor. The bridge contains some 15,000 rivets.

Deck Pour

Forms for the 7½-inch reinforced-concrete deck slab were built from 1-inch planks and supported by the steel superstructure. The bottom flanges of the I-beams supported vertical 4 x 4's on 18-inch centers, between the tops of which were stretched 2 x 6's. The deck forms were placed across these. At the end of every 50-foot bent a cork expansion joint was constructed.

Concrete was mixed in a CMC 16-S mixer set up on the bank, with the aggregate weighed in wheelbarrows on a Fairbanks-Morse platform scale. The concrete was discharged into an Inslay wedge-shaped bottom-dump bucket which was carried out to the forms by the cableway. As the concrete was dumped, it was vibrated with White vibrators. Then it was struck off with a steel longitudinal screed, 50 feet long, stretching across the entire span.

When spans over land were being thus poured, a haul line was attached to the cableway so that the bucket might be pulled to the extreme edges of the roadway and emptied of concrete. This procedure, of course, could not be followed when the span was over water, for there was no place for a man to stand to drift the line. So on the latter pours, a Jaeger 2-yard hopper mounted on rubber-tired wheels was

set up on the deck. The concrete was discharged into the hopper from the cableway bucket, and the hopper was pulled to the edges of the roadway forms. It was emptied either directly into the forms or into concrete buggies which were then wheeled to where the concrete was required. The buggies, with the hopper, were also used in pouring the sidewalk.

As work on the deck proceeded, the steel beams and girders were painted from below. The steel was delivered with one shop coat of red lead. It was then given a field coat of red lead and two coats of aluminum paint. The painters worked from scaffolds made of boards and hung by ropes from the steel superstructure. The paint was sprayed on with DeVilbiss guns, the compressed air being supplied by a Chicago Pneumatic 105-cfm compressor.

Quantities and Personnel

The major items on the Bayou Pierre bridge contract at Port Gibson, Miss., included the following:

Excavation	1,520 cu. yds.
Concrete	1,831 cu. yds.
Reinforcing steel	210,000 lbs.
Steel piling	7,500 lin. ft.
Structural steel	650 tons

Contractor John H. Moon employed an average force of 15 men, and supervised them himself. For the Mississippi State Highway Department, Robert M. Massey was Project Engineer. The Department is headed by R. A. Harris, Chief Engineer, with S. A. Tomlinson,

Construction Engineer, and C. S. Hill, Bridge Engineer.


Barnes Succeeds Parsons

Robert B. Barnes is the new Sales Manager of the Link-Belt Speeder Corp. He succeeds Hayes Parsons, who retired because of illness. Mr. Barnes will make his headquarters at the general office in Cedar Rapids, Iowa.

DECALS

IDENTIFY YOUR EQUIPMENT WITH COLORFUL DECALS. THE MODERN METHOD OF SIGN LETTERING EQUIPMENT.

FOR INFORMATION AND PRICES DEPT. A

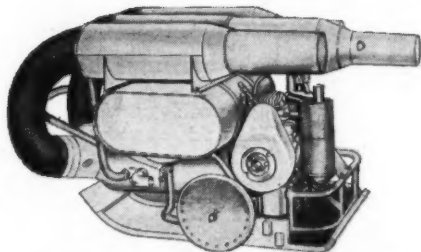


CONTINENTAL DECALCOMANIA CO.

572-4 DIVISION AVE., S. GRAND RAPIDS, MICHIGAN

Portable Heater Sale!

GOVERNMENT SURPLUS



COMPLETE WITH FLEXIBLE DUCTS

GENERAL DESCRIPTION

Stewart-Warner powerful Portable gasoline-burning heating unit equipped with turbine type blower and 1½ hp air-cooled gasoline engine. It is mounted on a frame equipped with a sled bottom and retractable wheels. Rated heat output is 100,000 BTU's per hour. No soot. No flame. No dirt. Self-powered. Self-contained.

HEATER

Stewart-Warner Hermetic Combustion type. Rated Heat Output . . . 100,000 BTU's per hour. Heat Output: 400 cubic feet per minute with temperature rise of 112° C. (233° F.) Overheat Switch set at 175° C. Igniter . . . Champion spark plug C-10-S.

HEATING

Buildings, Garages, Warehouses, Shops, Mills, Bunkhouses, Dry Rooms, Large Boarding Houses, Spot heating, Dairies, Barns, Homes, Greenhouses, Potato Cellars, Onion Sheds, Hog Sheds, Manholes, Tunnels, Buildings Under Construction, and many other uses.

DRYING

Corn, Grain, Seed, Popcorn, Hay, Tobacco, Concentrates or ore in conjunction with tumbler. Wet ore in bins. Plaster, Paint, Mortar, Concrete, Lumber, etc.

PRE-HEATING

Engines, Tractors, Trucks, Automobiles, Machinery, Aircraft, and other uses.

THAWING

Sand, Stone, Gravel, Frozen Ore or preventing freezing in Ore Bins, Frozen Areas, Machinery, Pipe Lines, Tanks.

VENTILATING

Manholes, Tunnels.

ENGINE

Engine is 1½ hp, air-cooled, ball-bearing, and can be used for other purposes. Engine can be left on portable frame or can be removed.

SPECIFICATIONS

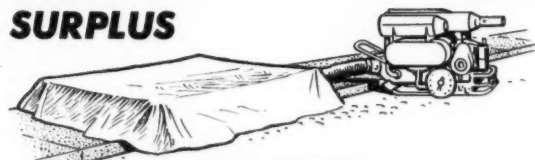
Complete unit: Net weight 200 lbs. Width 30 inches, Length 48-inches, Height 30-inches, Capacity of fuel tank—10 gallons.

ENGINE

Lauson RSC, ball bearing, air-cooled, 1½ hp. One-cylinder, 4-cycle, internal combustion, built-in magneto. Starts by rope. Ignition . . . Wico Magneto Engine can be removed.

CONDITION

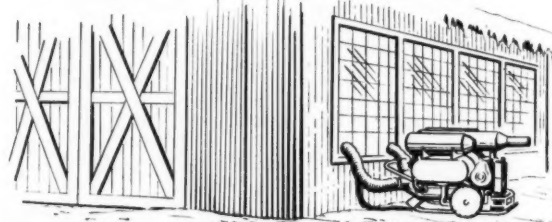
Every unit positively guaranteed to be in excellent operating condition.



DRYING CONCRETE

Reynold R. Hippner, Arthur A. Johnson Corp., Long Island, N. Y., says:

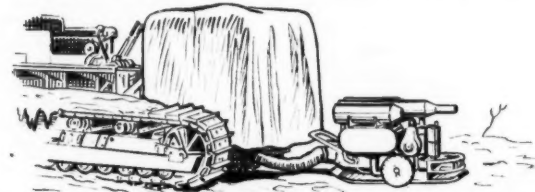
"We used our heater for heating and drying concrete, and we believe that other companies would definitely be interested for the same purpose, as the heater was most satisfactory."



HEATING SHOPS, SHEDS, WAREHOUSES, Etc.

Ralph Donaghy, Fountain Sand & Gravel Co., Pueblo, Colorado, thinks that:

"As an all-around utility heater, this unit can't be beat. We used ours for emergency heating throughout our plant—shops, warehouses, storage sheds, and anywhere else we needed lots of heat in a hurry."



PRE-HEATING EQUIPMENT

Long John Austin, General Contractor, Denver, Colorado, comments:

"We used our heater for heating equipment and for thawing material. We were very well pleased with its performance and versatility."

Phone us collect . . . your heater will be shipped today.

ORIGINAL PRICE ~~\$53~~
SALE PRICE \$195.

IMMEDIATE DELIVERY

BERNSTEIN BROTHERS MACHINERY CO.
PUEBLO, COLORADO SINCE 1890 PHONE 8404



A weight of 18 pounds and a length of 19 inches make the Le Roi 31 clay spade easy to handle, the manufacturer points out. This tool has a built-in lubrication system.

Lightweight Spade

A clay spade designed for ease of holding and to reduce digging and upkeep costs is announced by the Le Roi Co., 1706 S. 68th St., Milwaukee 14, Wis. The Model No. 31 spade has a 19-inch length and a total weight of 18 pounds.

The built-in oil system features the use of a large reservoir in the handle which meters oil into the live air stream from where it is carried to every working part. The cylinder, handle, and steel retainer are drop-forged. The spacer and chuck bushings are renewable.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 32.

Va. Highway Conference

The second annual Virginia Highway Conference, sponsored jointly by the Virginia Department of Highways and the Virginia Military Institute, was held in November at the VMI campus at Lexington, Va. Local and Federal groups interested in highway development also cooperated. Some 615 engineers and officials attended.

Featured at the meeting was an address by Pyke Johnson on highway planning and safety. Mr. Johnson is President of the National Automotive Safety Foundation. Other speakers included Hal H. Hale, Executive Secretary of the American Association of State Highway Officials; Major Thomas J. Allen, Regional Director of the National Park Service; Dr. N. W. Dougherty, Dean of Engineering at the University of Tennessee; E. F. Kelley, Physical Research Chief for the Public Roads Administration; and Dr. Robert H. Tucker, Dean Emeritus at Washington and Lee University. The conference also was the scene of several group meetings and panel discussions.

Special events on the program included movies, exhibits, a review of the VMI cadet corps, and a football game between VMI and The Citadel. "Highway U. S. A.," the Barber-Greene three-dimensional film of famous highways, which was so enthusiastically received at the ARBA Road Show, was shown at the meeting.

All-State Sales Manager

Appointment of Herman C. Phelps as Sales Manager is announced by All-State Welding Alloys Co., Inc., of White Plains, N. Y. Mr. Phelps formerly held the position of West Coast Regional Sales Manager, operating out of Seattle, Wash. He will be in charge of national sales and service for the entire line of All-State low-temperature welding and brazing alloys and fluxes.

Convair Holds Election

An election of officers has been held by the Convair Corp. of Pittsburgh, Pa. W. R. Sterrett was elected President; T. J. Davies, Vice President; and M. B. Snyder, Secretary-Treasurer. Convair makes pneumatic conveyors.

Conversion Units For All-Wheel Drive

An all-wheel-drive conversion unit for use with the new Ford heavy-duty trucks is announced by Marmon-Herrington Co., Inc., Indianapolis 7, Ind. There are six models in the Marmon-Herrington Q Series of converted trucks—three are 4-wheel drive, and three are 6-wheel drive. Gross vehicle weight for the 4-wheel-drive units is 21,500 pounds; for the 6-wheel-drive units, 35,000 pounds. Wheelbases range from 136½ to 220 inches.

The Marmon-Herrington conversion units are installed by replacing the front-axle assembly; installing a 2-speed auxiliary transmission which provides a total of 10 forward speeds and 2

reverse; making necessary changes in the steering assembly and brake connections; and, on the 6-wheel-drive assemblies, lengthening the frame and installing a third driving axle-and-wheel assembly. Tires are replaced when necessary.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 69.

Gasoline-Engine History

A line of air-cooled gasoline engines is described in a catalog prepared by the Wisconsin Motor Corp., 1910 S. 53rd St., Milwaukee 14, Wis. The engines are made in sizes and styles to fit every power purpose in the 2 to 30-hp range. And the catalog contains a large num-

ber of photographs showing their construction and application. Featured is a brief history of the men, dates, and events connected with the development of the air-cooled gasoline engine.

Several photographs taken in the Wisconsin factory show the building of these engines. Another series of photographs illustrates their applications in construction, in municipal work, for powering specialized equipment, in railroad-maintenance work, etc. Specifications listed cover bore and stroke, number of cylinders, displacement, hp and rpm ratings, weight, parts comprising the complete engine, and special accessories.

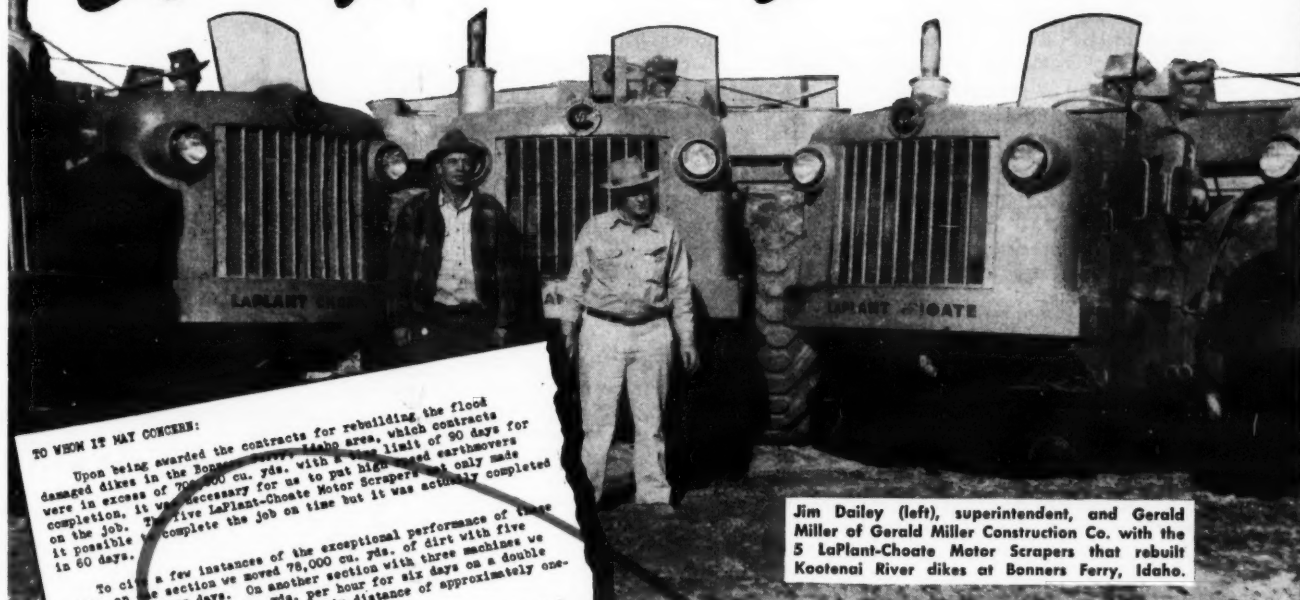
Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 67.



LPC MOTOR SCRAPERS

complete 700,000-yard earthmoving job

30 days ahead of schedule



TO WHOM IT MAY CONCERN:

Upon being awarded the contracts for rebuilding the flood damaged dikes in the Bonners Ferry area, which contracts were in excess of 70,000 cu. yds. with a time limit of 90 days for completion, it was necessary for us to put high speed earthmovers on the job. The five LaPlant-Choate Motor Scrapers not only made it possible to complete the job on time but it was actually completed in 60 days.

To cite a few instances of the exceptional performance of these units, on the section we moved 78,000 cu. yds. of dirt with five machines in seven days. On another section with three machines we moved an average of 500 cu. yds. per hour for six days on a double shift or 20-hour day over a round trip distance of approximately one-half mile.

I have had several years experience in construction work and I feel that these pieces of equipment are the most modern machines there are on the market today.

Gerald Miller
Gerald Miller, Contractor

October 13, 1948

Jim Dailey (left), superintendent, and Gerald Miller of Gerald Miller Construction Co. with the 5 LaPlant-Choate Motor Scrapers that rebuilt Kootenai River dikes at Bonners Ferry, Idaho.

Gerald Miller rebuilds Kootenai River dikes at Bonners Ferry, Idaho, in record time under difficult conditions.

BIG POWER—16 h.p. per struck yard; and big tires—21 x 29-00! These features of LaPlant-Choate Motor Scrapers enabled Gerald Miller to complete this tough earthmoving job way ahead of schedule. In spite of soft, spongy borrow pit and haul road, the five units picked up capacity loads in 50 to 70 seconds and dumped them in 15 seconds.

Join the fast growing number of contractors who have replaced their earthmoving equipment with high speed LaPlant-Choate Motor Scrapers. You can start building up your fleet without waiting. See your nearest LPC distributor for details. LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa; 1022 77th Ave., Oakland, Calif.

LAPLANT CHOATE

HIGH SPEED EARTHMOVING EQUIPMENT

Distributor Doings

Program Announced by AED For Its 1949 Convention

The 30th Annual Meeting of the Associated Equipment Distributors has been set for January 16-20, 1949, at the Stevens Hotel in Chicago. More than 1,500 distributors and manufacturers of construction equipment are expected to be in attendance. The occasion will mark the beginning of the AED's fourth decade of service to the construction-equipment industry.

The meeting will get under way on Sunday, January 16, with registration and the Local Association Round Table. Monday, the westerners from Region 11 will sponsor the Early Birds' Breakfast in honor of out-going President Al Garlinghouse. They promise faithfully that codfish and baked beans with maple syrup will definitely not be on the menu.

As a special innovation of the 1949 meeting, no business sessions or luncheons have been scheduled on Tuesday in order that the entire day may be spent by the distributors and manufacturers in discussing specific subjects of mutual concern. The evening, however, will be a festive occasion, with the Annual Birthday Ball held in the Main Ballroom.

On Wednesday, the election of officers for 1949 will take place. This will be followed by an open forum with a 6-man panel and moderator discussing those problems which confront construction-equipment distributors. The Installation Luncheon will take place at 1:30 on Wednesday, with the remainder of the day set aside for additional contacts between distributors and their manufacturers.

Thursday has been turned over to the AED manufacturer members, who will present a panel discussion dealing with various phases of manufacturer-distributor relations. They will also sponsor the noon luncheon, after which the 30th Annual Meeting of the AED will officially close.

Anderson Heads Region IX

A. C. Anderson has been named Director of Region IX of the Asso-

ciated Equipment Distributors, to succeed William A. Clayton, who has joined the Chain Belt Co. as Eastern Sales Manager. Mr. Clayton formerly was with the Fuchs-Clayton Machinery Co. of Omaha, Nebr. Mr. Anderson is head of the Anderson Equipment Co. of Omaha. Region IX comprises Iowa, Kansas, Missouri, and Nebraska.

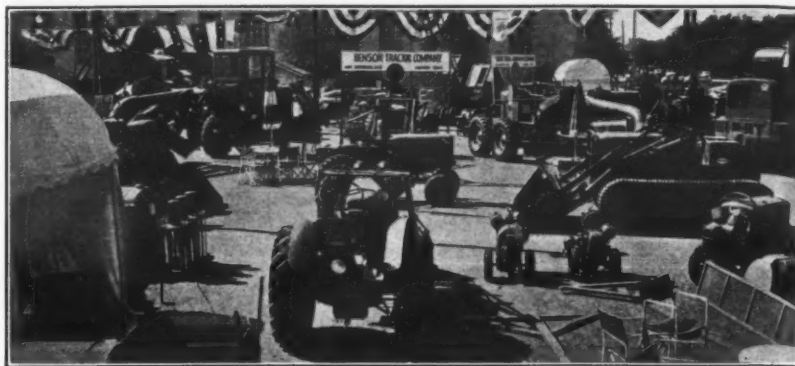
Cooke Co. Expands in Mo.

The Cooke Tractor Co. has expanded its facilities for covering eastern Missouri and the western part of southern Illinois by opening a branch in Fulton, Mo. The plant is located on Highway 54 on the south edge of town. It is a one-story-high building, approximately 50 x 80 in size, and includes a parts department, service area, offices, and construction-equipment display room. An open-storage area is located at the rear of the building. The company's main office is at 2120 S. 7th St. in St. Louis, Mo.

Companies represented by Cooke include: Allis-Chalmers Mfg. Co., Gar Wood Industries, Inc., The Baker Mfg. Co., Wayne Crane Division, Davey Compressor Co., Knickerbocker Co. (concrete mixers), Diamond Iron Works, Inc., Schield Bantam Co., Sterling Machinery Corp., Quincy Compressor Co., Frank G. Hough Co., Detroit Harvester Co., Pettibone Mulliken Corp., Yaum Dragline Buckets & Mfg. Plant, Erie Steel Construction Co., Drott Mfg. Co., Henry Mfg. Co., Eversman Mfg. Co. (land levelers), Ottawa Steel Products, Inc., Slusser-McLean Scraper Co., Shaw Sales & Service Co., Shovel Supply Co. Mill & Mine Supply, Inc., Winslow Government Standard Scale Works, Inc., Tractomotive Corp., Dorsey Trailers, Pacific Car & Foundry Co., and Tulsa Winch Division.

Davey Dealer in Ohio

The H. B. Fuller Equipment Co., Cleveland, Ohio, has been named a dealer for the Davey Compressor Co. Fuller will maintain complete parts and service facilities for Davey users in northern Ohio. Headquarters are located at 8200 Jones Road in Cleveland.



A number of equipment distributors were among the 300 exhibitors represented at the first Houston Construction Industries Exposition this past October.

Houston Construction Industries Exposition

The broad objective of the recent Houston Construction Industries Exposition, sponsored by the Houston Chapter of The Associated General Contractors of America, Inc., was to

do a public-relations job for the entire construction industry. Its sponsors aimed to show the importance of construction as a leading industry of the nation, and to establish Houston as an important manufacturing and distributing source of construction (Continued on next page)



"a word to the wise"...

STORM WARNINGS ARE FLYING

Cold and wet weather ahead means you will need tarps—and when you need them...you want them PRONTO!

Send out your S. O. S. to your dependable Wenzel distributor. He will fill your tarpaulin requirements immediately from his complete stock.

For cold and rain... SPECIFY Wenzel "Para" Waterproofed Tarpaulins.

Processed with a genuine paraffin base—Para Tarpaulins contain no oil or clay. They are air-dried... never exposed to damaging heat. Para Tarpaulins are completely water-

proof, stronger and tougher... to give you PLUS-SERVICE.

For added Fire-Protection... SPECIFY Wenzel Fire and Water Resistant Tarpaulins.

These new, high-quality Tarpaulins are processed by a new-improved method. Guaranteed to give you longer service and greater protection against fire-loss.

Full breaking strength—guaranteed new...not Government Surplus. Duck woven... treated... after Sept. 1, 1948. No risk of fabric weakening due to long storage and prolonged chemical action.

H. WENZEL TENT & DUCK CO.
ST. LOUIS, MISSOURI

WENZEL TARPAULIN DISTRIBUTORS

NEW ENGLAND Hedge & Mattheis Co. Parker-Danner Co.	PENNSYLVANIA Austin Supply Co., Inc., Philadelphia Dravo-Doyle Co., Pittsburgh	INDIANA Standard Equipment & Supply Corp., Hammond
NEW YORK Drennen Steel Products Corp., Syracuse Keystone Builders Supply Co., Inc., Rochester Mahoney-Clarke, Inc., New York City Stillwell Supply Corp., Long Island City Trevor Corp., Buffalo R. B. Wing & Son Corp., Albany	OHIO Rish Equipment Co., Cincinnati The W. T. Walsh Equipment Co., Cleveland MICHIGAN Contractors Machinery Co., Grand Rapids WISCONSIN Prime-Best, Inc., Milwaukee MINNESOTA Minneapolis Equipment Co., Minneapolis SOUTH DAKOTA Pecaut Industrial Supply Co., Sioux Falls NEBRASKA Anderson Equipment Co., Omaha IOWA Harry Alter & Sons, Davenport Pecaut Industrial Supply Co., Sioux City ILLINOIS Clark & Barlow Hdw. Co., Chicago Joseph Behr & Sons, Rockford Becker Equipment & Supply Co., Chicago	MISSOURI Brown-Strauss Corp., Kansas City Machinery & Supplies Co., Inc., Kansas City The Victor L. Phillips Co., Kansas City MISSISSIPPI Contractors Material Co., Inc., Jackson LOUISIANA Pelican Well Tool & Supply Co., Shreveport TEXAS J. E. Ingram Equipment Co., San Antonio OKLAHOMA Mideke Supply Co., Oklahoma City The Victor L. Phillips Co., Oklahoma City ARIZONA Industrial Equipment Co. of Arizona, Phoenix CALIFORNIA Industrial Equipment Co. of Southern California, Los Angeles Standard Machinery Co., San Francisco

For 61 Years... America's Foremost Manufacturer of Quality Tarpaulins

Urgently Needed • NOW It's Here

Mall One-Man SHORT COUPLED VIBRATOR



\$158.00
FOB CHICAGO

Perfect tool for placing concrete in small forms, thin wall sections or hard-to-reach spots in forms. Also for use as edge vibrator or for expansion joints on pavement work.

Compact, lightweight and shortcoupled, with 1½ H. P. electric motor built in, this Mall Vibrator is designed for one-man use. It gives all the speed, ease and efficiency of larger Mall Vibrators and can be easily carried up and down ladders and operated from scaffolding.

This new one-man unit completes the full line of Mall Concrete Vibrators. Now—whether your job is a bridge, building, culvert, sewerage treatment or disposal plant or a concrete pavement, there is a size and type Mall Vibrator to do the work efficiently and quickly.

Let your Mall Dealer help you select the proper equipment for your needs... or write TODAY for complete literature on Mall Vibrators.

MALL TOOL COMPANY, 7743 South Chicago Ave., Chicago 19, Ill.

Distributor Doings

(Continued from preceding page)

materials. More than 300 exhibitors were represented, including about 20 construction-equipment dealers.

In addition to its display of construction equipment, the exposition featured educational booths showing construction practices and methods, and other exhibits of interest to contractors, awarding officials, engineers, and others interested in the nation's construction, as well as to the general public. Popular prices prevailed—60 cents for adults, 30 cents for children—and exposition officials estimated that a considerable number of visitors attended more than once during the nine-day show. Added attractions, on the entertainment side, were Houston's first television demonstrations, nightly shows by Sammy Kaye and his orchestra, and the awarding of a \$25,000 prize home.

Among construction-equipment dealers who had outside exhibits of their machines were: Anderson Equipment Co., Benson Tractor Co., Browning-Ferris Machinery Co., Boehck Engineering Co., Inc., Brennan Equipment Co., Cochran Equipment Co., R. B. Everett & Co., F. W. Gartner Co., Hi-Way Equipment Co., J. E. Ingram Equipment Co., McCall Tractor & Equipment Co., Overton & Ross, Safety Scaffolds Co. of Texas, Shepler Equipment Co., South Texas Equipment Co., and Stewart & Stevenson.

The Houston AGC was so gratified by the large attendance and acclaim from the public and exhibitors that it has booked the period of September 25 to October 3, 1949, for next year's exposition. Slightly more than half of the 334,297 visitors, it was estimated, were people within the construction industry.

Four New Gumout Agents

Four agents for Penn Drake Gumout, a gum solvent for cleaning carburetors, fuel pumps, and gas lines, have been appointed by the Pennsylvania Refining Co. Glen T. Lees Associates of Minneapolis, Minn., will cover the territory consisting of North and South Dakota, Minnesota, and northwestern Wisconsin. A. C. Doherty & Co., Bos-

ton, Mass., will cover Maine, New Hampshire, Vermont, Massachusetts, Connecticut, and Rhode Island. Hattendorf Sales Co., Atchison, Kans., will cover Missouri, Kansas, Iowa, and Nebraska. And General Sales Associates, Nashville, Tenn., will cover Tennessee, Alabama, and Mississippi.

Viles on Advisory Group

Fred M. Viles, heavy-equipment distributor of Spokane, Wash., has been appointed Chairman of the Subcommittee on Industrial Machinery and Equipment, of the Small-Business Advisory Committee of the Department of Commerce. The Small-Business Advisory Committee was established to afford quick action and representation to various branches of industry in dealing with legislative or administrative proposals.

Sales Outlets for Dart

Several new distributors and dealers have been appointed by the Dart Mfg. Co. They are: Harry Cornelius Co., Albuquerque, N. Mex.; Funkhouser Machinery Co., Kansas City, Mo.; Gesner Equipment Corp., New Haven, Conn.; Gunderson-Taylor Machinery Co., Denver, Colo.; Virgil Heck Equipment Co., Louisville, Ky.; Kessler-Simon Machinery Co., Oklahoma City, Okla.; Martin-Roosa T. & E. Co., Cedar Rapids, Iowa; Midwest Machinery & Supply Co., Lincoln, Nebr.; Overton & Ross of Dallas, Texas; Overton & Ross of Wichita Falls, Texas; Priester Machinery Co., Memphis, Tenn.; Rozier-Ryan Co., St. Louis, Mo.; Star Machinery Co., Seattle, Wash.; Seitz Machinery Co., Billings, Mont.; Tractor & Equipment Co., Birmingham, Ala.; Wilson Equipment Co., Cheyenne, Wyo.; Missouri Valley Machinery Co., Omaha, Nebr.; Le Roi-Rix Machinery Co., Los Angeles, Calif.; Shriver Machinery Co., Phoenix, Ariz.; Colorado Builders Supply, Denver, Colo.; Dakota Tractor & Equipment Co., Fargo, N. Dak.; Hendrie & Bolthoff Mfg. & Supply Co., Denver, Colo.; and M. B. Salisbury Co., Inc., Topeka, Kans.

Dart manufactures concrete vibrators in three gasoline-powered sizes and two electric models. All units embody the new helixed eccentric principle, said to place the load over a greater area of the ball race and thus lengthen bearing life.

Gradall Dealers in East

The Warner & Swasey Co. announces the appointment of two new distributors for its Gradall earth-moving machine. E. H. Kliebenstein Co. of Hendricks Causeway, Ridgefield, N. J., will handle sales and service for northern New Jersey. And Tyler-Preusser Inc., located on the Boston Post Road, Pel-

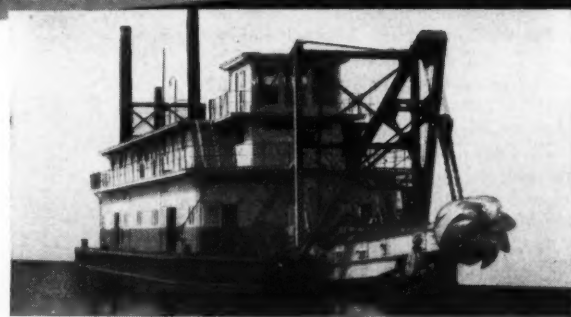
ham Manor, N. Y., will service metropolitan New York and Long Island.

Virginia Tractor Co. News

The formal opening of its Richmond plant and offices was recently celebrated by the Virginia Tractor Co. The new plant, located at 1901 Westwood (Concluded on next page)

SLASH YOUR DREDGING COSTS with ELLICOTT HYDRAULIC DREDGES

● Ellicott is the only organization with the experience and equipment to build any size dredge from 6 to 30 inches. Shown is a 16-inch, deep channel Diesel-powered Dredge.



WHATEVER your requirements, whether dredging a river channel, filling a swamp, or producing sand and gravel, your cost per cubic yard of material goes way down with an Ellicott Hydraulic Dredge.

That's because each Ellicott Dredge, from 6-inch to 30-inch machines, is designed to meet your needs. It has the right cutting head for material to be worked, the proper pump for length of the line to the disposal area—completely engineered from stern to stern to operate at the lowest cost.

Ellicott has built hydraulic dredges since 1885 and is the only organization in the world devoted exclusively to hydraulic dredge construction. When you specify Ellicott you get operating economy, because all dredge components are designed, built and delivered by Ellicott—all under one contract!

No matter if you wish to assemble your dredge from Ellicott components and plans, or want the dredge delivered complete, Ellicott is prepared to submit estimates without obligation. Write today for full information on Ellicott Dredges.



HYDRAULIC DREDGES

any type—any size—any service

ELLICOTT MACHINE CORPORATION

1613 Bush Street, Baltimore, Maryland, U. S. A.

● COMPLETE LINE from 6 to 30 inch equipment for all dredging requirements.
● 63 YEARS OF EXPERIENCE with hydraulic dredges.
● UNDIVIDED RESPONSIBILITY—Designed, built, delivered under one Ellicott contract.
● PROVED PERFORMANCE in the U. S. A. and abroad.

It's **NEW!**
GALION No. **116**
MOTOR GRADER

Write for
CATALOG
No. 315

100 h.p.

for Extra Heavy-Duty Service

THE GALION IRON WORKS & MFG. CO.
General and Export Offices Galion, Ohio, U. S. A.



Distributor Doings

(Continued from preceding page)

Ave., provides over 36,000 square feet of floor space and includes a repair shop, service department, parts department, showroom, and offices. Cost of the building is estimated at \$250,000. The company also maintains branches in Roanoke, Norfolk, and Waynesboro.

Lines handled by the company include: Athey, Buffalo-Springfield, Case, Caterpillar, Fleco, Hyster, Cederapids, Jaeger, Trackson, Thew, and Thor.

Lietz Co. Goes Into Sales

Appointment of a dealer for the territory comprising California, Oregon, Nevada, Arizona, New Mexico, and El Paso, Texas, is announced by W. & L. E. Gurley, maker of engineering and scientific instruments. The dealer is A. Lietz Co., which maintains offices in Los Angeles and San Francisco. Coincident with the appointment, the Lietz Co. announces that it has discontinued the manufacture of its own line of surveying instruments which was started in 1882.

Texas Dealer for Goodyear

The Republic Supply Co., Houston, Texas, has been appointed a distributor of industrial rubber products by the Goodyear Tire & Rubber Co. One of the largest supply houses in the southwest, Republic maintains 7 district offices and operates 48 service stores in the Texas area.

Thompson Joins Smith, Inc.

Smith, Inc., construction-equipment distributor of Fargo, N. Dak., has obtained the services of Bert T. Thompson. Mr. Thompson will represent the company in ten counties in northwestern Minnesota, from the Canadian border south to include Wilkin County.

Scaffold Dealer In Ala.

Underwood Coal & Supply Corp. of Mobile, Ala., has been appointed a distributor by Patent Scaffolding Co., Inc. Located at 265 Water St., Underwood will handle the Trouble Saver sectional scaffolds, as well as Gold Medal safety ladders and scaffolding accessories, in parts of Alabama and Florida.

Dealer in Eau Claire, Wis.

Miller, Bradford & Risberg Co., Inc., construction-equipment distributor of Eau Claire, Wis., has been appointed by R. G. LeTourneau, Inc., to handle its line of earth-moving equipment in all of Wisconsin, except for 11 northwestern counties. The distributor firm is located at 203 N. Dewey St. and it maintains a parts department and warehouse near the intersection of highways U. S. 12 and Wisconsin 37. Other lines it handles include Jaeger, Barber-Greene, Oshkosh, Huber, Quick-Way, Byers, Minneapolis-Moline, and Lull.

Portable Compressors

Portable gasoline-driven air compressors in three styles are manufactured by the P. K. Lindsay Co., 97 Tilton St., Everett 49, Mass. They are mounted on a special portable type of chassis, or the two larger models can be mounted on a 2-wheel trailer for towing by automobile.

The Model AK-9 is powered by a 3-hp engine, has a piston displacement of 15 cfm, and weighs 150 pounds. Working pressures are adjustable from 50 to 80 pounds and the actual delivery

rate is adjustable from 7 to 12 cfm depending on speed and pressure. The Model ZZ-15 is powered by a 5-hp engine, has a piston displacement of 25 cfm, and weighs 220 pounds. Working-pressure range is from 50 to 100 pounds, and delivery rate can be varied from 9 to 17 cfm. The Model E-22-L is powered by a 6-hp engine, has a piston displacement of 30 cfm, and weighs 355 pounds. Working pressure is adjustable from 50 to 100 pounds, and delivery rate is adjustable from 17 to 22 cfm.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 110.

Hyster Promotes Johnson

Ronald A. Johnson has been named Assistant to Paul Brainard, head of the Engineering Standards Department at the Portland, Oreg., plant of the Hyster Co. Mr. Johnson will work towards standardization of design and materials in the company's three factories.



The new Owatonna double-end ratchet box wrench, constructed of alloy steel, is available in five sizes which range from 1/4 x 5/16 to 3/4 x 7/8 inch.

Ratchet Box Wrench

Double-end ratchet wrenches in five sizes are available from the Owatonna Tool Co., 348 Cedar St., Owatonna, Minn. Feature of these box wrenches is the alloy steel used for their construction. The five sizes—1/4 x 5/16, 3/8 x 7/16, 1/2 x 9/16, 5/8 x 11/16, and 3/4 x 7/8 inch—provide a range useful for work on tractors, automobiles, trucks, and construction equipment, the manufacturer points out. The wrenches are said to be especially handy for use in close places.

Further information on these tools may be secured from the company, or by using the enclosed Request Card. Circle No. 27.

Vibrators in Five Sizes

A line of concrete vibrators is described in bulletins issued by the Electric Tamper & Equipment Co. of Ludington, Mich. These one-page bulletins describe the features and operation of the Jackson Model FS-6A gasoline-powered flexible-shaft vibrator; the FS-7A electric-powered flexible-shaft vibrator; the Model HS-A4 gasoline-powered hydraulically driven vibrator; the VS-4 heavy-duty vibrator for mass-construction jobs; and the VS-E2 general-purpose heavy-duty vibrator.

These bulletins provide information on general features, length and diameter of heads available for use with each model, power units and power requirements, construction and sizes of the vibrator shafts, frequency of vibration, method of coupling, etc. Each unit is illustrated to show its construction and applications.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 63.

Sure, America's going ahead... if we all pull together!

Let's compare *yesterday* with *today*... that will give us an idea of what tomorrow can be!

Machine Power: Since 1910 we have increased our supply of machine power $4\frac{1}{2}$ times.

Production: Since 1910 we have more than doubled the output each of us produces for every hour we work.

Income: Since 1910 we have increased our annual income from less than \$2400 per household to about \$4000 (in dollars of the same purchasing power.)

Work Hours: Yet, since 1910 we have cut 18 hours from our average workweek—equivalent to two present average work-days.

HOW have we succeeded in achieving all this? Through the American kind of

teamwork! And what is *teamwork*?

American teamwork is management that pays reasonable wages and takes fair profits—that provides the best machines, tools, materials and working conditions it possibly can—that seeks new methods, new markets, new ideas; that bargains freely and fairly with its employees.

Our teamwork is labor that produces as efficiently and as much as it can—that realizes its standard of living ultimately depends upon how much America produces—that expects better wages as it helps increase that production.

Teamwork is simply working together to turn out more goods in fewer man-hours—making things at lower costs and paying higher wages to the people who make them and selling them at lower prices to the people who use them.

What we've already accomplished is just a foretaste of what we *can* do. It's just a start toward a goal we are all striving to reach: better housing, clothing, food, health, education, with ever greater opportunities for individual development. Sure, our American System has its faults. We all know that. We still have sharp ups and downs in prices and jobs. We'll have to change that—and we will!

It will continue to take *teamwork*, but if we work together, there's no limit on what we can *share together* of even greater things.

WANT TO HELP?

This is the first of a series of advertisements in The Advertising Council's Economic education campaign. This important program can be effective only through the strong support of advertisers everywhere. For information about the succeeding ads write to: The Advertising Council, Inc., Dept. A, 11 West 42nd St., New York 18, N. Y.



What we have already accomplished is just a foretaste of what we can do—if we continue to work together!

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American Federation of Labor

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Concrete Overpass Bridges Busy Road

Form Work Prefabricated During Winter Months and Installed Later on New Rigid Concrete Bridge

† ALL over the United States in 1948 new roads and bridges have been built to serve future automobile traffic for many years. Typical of the small structures in many of these places is a \$158,000 overpass to carry Telegraph Road over a new relocation of Highway 77, near St. Louis, Mo.

South of St. Louis at Mehlville, traffic flow has increased over the Mississippi River bridge at Jefferson Barracks. To carry this increased traffic, and to relieve the situation at the Telegraph Road intersection, the Missouri State Highway Department let a \$428,678 contract for 1.7 miles of grading and 24-foot portland-cement concrete pavement, and a new rigid-frame continuous-girder reinforced-concrete overpass structure.

The joint-venture firms of J. E. Latta Construction Co., Grantwood Contracting Co., and Henry L. Perkinson, all of St. Louis, submitted the successful bid. The bridge structure was built by J. E. Latta Construction Co., the grading was done by Grantwood, and the paving work will be done at a future date by Perkinson. Construction of the overpass was started in September, 1947; it was scheduled to be finished by July 15, 1948.

Design of Bridge

The new overpass was designed for H-20 loading, with reinforcing-steel stresses of 18,000 pounds per square inch, and concrete stresses of 1,000 pounds per square inch. It is a low, symmetrical structure, standing nearly at right angles to the pavement below.

Total length overall is 225 feet, including the abutment approaches. Overall width of the superstructure is 66 feet 10 inches, but the roadway proper is 52 feet wide. It has a parabolic crown of 4 11/16 inches with a sharp break at the quarter point, a traffic curb, and two pedestrian walkways 5 feet 2 inches wide. Hand rails on either side of the



C. & E. M. Photo

Note how steel H-beams support the vertical 6 x 6-inch falsework timbers in this photo of the Telegraph Road overpass job. Rocker assemblies for the center pier lie on the ground prior to being set in place.

pedestrian sidewalks are 3 feet high.

Three main piers, keyed to solid rock and built of reinforced concrete, carry the main deck. They rest on doweled steel rocker plates. The deck slab at each abutment rests on three bents of 11 concrete piles each, with a reinforced-concrete pile cap and slender square piers rising atop the pile cap.

The job posed some interesting problems in small-bridge building. The specifications called for a 6-sequence deck pour, monolithic with the girders. This type of structure made it impracticable to strip and move ahead the forms. It was necessary to leave them all in place until the overpass was finished.

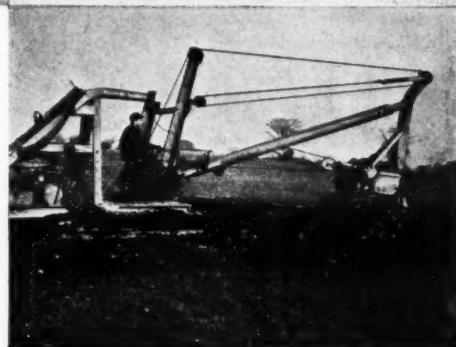
Specifications also called for the use of absorbent cheesecloth and fiber board on the insides of the forms. It was not used on deck forms except overhang. But where it was used, it had to be put on ahead of the steel reinforcement at the time the forms were built, and by the time the men had walked over it in

(Continued on next page)

*Portability
at NO SACRIFICE
of OPERATING EFFICIENCY*



IN ROUGH GROUND



IN MUD



IN SAND

The Badger can be placed on the special wheel mounts shown in the photograph above in from 15 to 20 minutes; towed from job to job at motor truck speed, and dismantled in from 5 to 10 minutes. The center of gravity of the machine on wheel mounts is low, the bottom of the crawlers being but 9 1/2" from the ground.

Once on the job, the crawler mounted Badger works at top efficiency regardless of whether the footing is smooth or rough, firm or soft. The 3/4-swing design provides the lighter swinging weight and faster swinging speed that move more material on every job.

Money is made working, not traveling. In the great majority of cases it will be found that the superior performance of the crawler mounted unit as compared with a similar unit mounted on rubber will far more than compensate for the few extra minutes it takes to mount and dismount the crawler unit.

AUSTIN-WESTERN COMPANY • AURORA, ILLINOIS, U. S. A.



Hose
BOOTS or CLOTHING

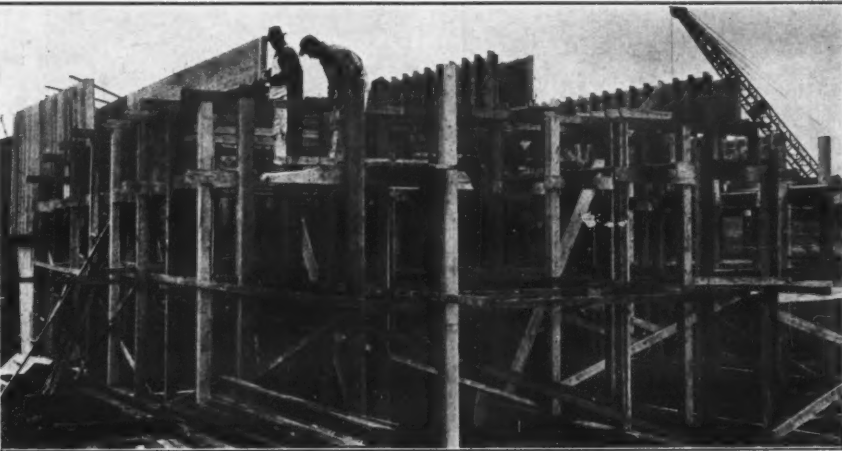
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CONTINENTAL
RUBBER WORKS
KIEFFER, PENNSYLVANIA • U. S. A.

BUILDERS OF ROAD MACHINERY
Austin Western
SINCE 1889



C. & E. M. Photos

At left, carpenters of J. E. Latta Co. help swing a 6 x 6 timber in place as they set falsework for the Telegraph Road overpass. Above, a crane sets wooden form panels in place.

Concrete Overpass Bridges Busy Road

(Continued from preceding page)

placing the steel, quite a bit of disturbance resulted. Also, on rainy days, it was difficult to keep the material dry. One of the best pours on the early part of the job was made on a damp day, however, in a light drizzle, when the absorbent material was wet. And later, the north wall was poured partly in the rain, without much difficulty.

Structural Excavation

Early in the job, Latta moved a Link-

Belt crane to the work site. Using a 1-yard clamshell bucket, this machine made the excavations for the piers and dug out the abutments where the concrete pile caps were to be poured.

The three main pier excavations were carried from 8 to 22 feet deep, well into solid rock. A compressor and two jackhammers helped out in this work. Quite a bit of shale was penetrated before the state inspectors pronounced the foundation material solid rock.

Fortunately, no ground water came up in the holes, despite the fact that the job was only about 1½ miles from the Mississippi River. The forms were set in place and pours brought the piers up to the ground line.

Pile driving was done with a set of shop-made H-beam leads, a Vulcan steam hammer, a small horizontal boiler, and the crane. Octagonal 16-

inch reinforced-concrete piles, in lengths from 20 to 35 feet, were driven to full bearing on solid rock. Pile spacing called for 11 piles to the bent, 7½

feet on centers, with two piles at each side of the bent. The bents were placed 14 feet apart.

As soon as the piles were driven, a pile cap 30 x 24 inches was formed and poured, and a T-shaped cap was made to catch the tops of the double piles.

Falsework and Formwork

One of the unusual features of the job was the system of strong falsework under the bridge forms, which prevented settlement and guaranteed a smooth job. Low-grade concrete piers approximately 14 inches in diameter were poured in place on solid rock, and steel girders 15 inches high were set on top of these piers and leveled. Subplates were then placed, and 8-inch H-members were laid crosswise on top of the girders to take the upright falsework. Set in this manner on steel and solid rock, the base could not move as the deck load was put on. For a portion of the falsework, heavy timbers were substituted for H-beams.

(Concluded on next page)



New Holland Double Impeller Breakers Put Bigger Profits in Every Ton by Eliminating Secondary Reduction

The Dual Impact Action of this revolutionary breaker produces clean, cubical stone with controlled proportions of fines. Simple adjustment of breaker bar spacing and impeller speed provides complete control of all production characteristics . . . down to 80% minus 1" from run-of-the-quarry stone in *one fast operation*. The product can always be made to suit the prevailing demand without extra reduction costs.

In the breaker there are two perfectly balanced, smooth turning impeller assemblies weighing about two tons apiece. These whirl away from each other, at speeds from 390 to 1000 rpm, striking upward, outward, sledge-like blows. Stone entering the breaker is smashed and the

pieces, crashing against each other and against sturdy breaker bars, are rapidly reduced to desired size.

Because the impellers turn away from each other, there is *no grinding action*. No choking or packing is possible . . . high production rates are assured. The product is uniformly cubical and clean . . . readily salable for every use. Low power requirement adds *extra profits* to every ton.

Learn how controlled reduction by impact can mean bigger profits for you. Write today for full information on the New Holland Double Impeller Breaker. Range of four sizes includes the best breaker for your operation.

Ask your New Holland Distributor to arrange a showing of "The New Stone Age." This full color, sound movie can bring you up-to-date on the stone crushing industry in just 20 minutes.

NEW HOLLAND MANUFACTURING COMPANY

Division of New Holland Machine Company

MOUNTVILLE, PA., U.S.A.



15,000 V. P. M. IN CONCRETE

with
**FLEXIBLE
SHAFT SPEED
OF ONLY 3,600 R. P. M.**



This amazing step-up in frequency of the vibrator head is made possible by a patented, non-eccentric rotor device found only in Vibro-Plus "Rollgear" vibrators.

50% higher frequency guaranteed—Low speed flexible shaft

- save as much as a bag of cement per cu. yd.
- concrete of uniform strength and density
- less mechanical wear and tear
- longer unit life

No time is lost for periodic stripping down. The flexible shaft can be lubricated in less than 20 seconds. *The Vibrator Head Runs Dry.* No clamping or screwing needed at the power source.

"Rollgear" is designed and built for long, uninterrupted work periods.

ELECTRIC GASOLINE PNEUMATIC

VIBRO-PLUS CORPORATION

Internal and External Vibrating Equipment

243 West 55th Street

New York 19, New York



Upright falsework consisted of 6 x 6-inch timbers, set in pairs 3 feet apart under the bridge girder forms. These were placed 5 feet apart. The tops of the uprights were sawed off to the proper elevation, and capped with 6 x 6-inch timber cross members.

The concrete form panels were made up mostly through the winter months, when field work was impossible, in the St. Louis warehouse of J. E. Latta. They were then brought out in the early spring and set up. All form lumber was sawed out from 1 1/4-inch pine lumber, surfaced on four sides. The 10-inch planks were pulled tight with clamps before nails were driven, in order to minimize as much as possible the shrinkage from the green boards.

Studs were made of 2 x 6-inch timbers, placed 16 inches on centers. Double 2 x 6's were placed where it was planned to tie the two forms together with Richmond steel Tyscrus. These steel form bolts act both as form ties and as spreaders.

Wherever it was possible, the absorbent material was placed after the forms were in place, but in most instances the heavy mats of steel made it necessary to place this material at the time the form panels were set up. The Link-Belt crane picked up and set falsework and the form panels.

Concrete Work

Type B concrete, batched according to Missouri State Highway Department specifications for this material, was sent to the job in truck-mixers from a central batching plant owned and operated by Hinrichs-Golterman Fuel & Material Co. of St. Louis. The truck-mixers discharged the concrete to a 1-yard Blaw-Knox concrete bucket, which was then picked up and hoisted to the pour by the Link-Belt crane. A small Jackson internal-type vibrator was being used to consolidate the material when the job was visited. Later, two or three vibrators were in use.

Surface finishing on the bridge deck was done with stiff fiber-bristle brooms. The piers and undersides of the overpass structure were dressed up with Carborundum stones, after workmen had filled the tie cone holes with stiff mortar and dressed off any of the blemishes left behind the absorbent form material where it had bulged.

Some 1,750 cubic yards of concrete were handled in the construction of the overpass, along with 270,070 pounds of steel reinforcement.

Personnel

The Telegraph Road overpass was designed by and was under the general supervision of State Highway Engineer Carl W. Brown, with J. J. Corbett as Engineer of Construction. W. L. Chandler was the Resident Engineer on the work. O. W. Michaelis was the wide-awake and alert Carpenter Foreman on the job for Latta Construction Co.

Rubber-Tire Roller Exerts 50-Ton Load

A 50-ton rubber-tire compactor with oscillating wheels is manufactured by the Wm. Bros Boiler & Mfg. Co., 1057 Tenth Ave., S. E., Minneapolis 14, Minn. With a 50-ton gross load, the Model No. 6 roller has a maximum travel speed of 5 mph. It can be used in combination with 2-wheel rubber-tired tractors, or can be equipped with a dual-front-wheel dolly for use with crawler tractors.

The roller gives a coverage of 8 feet 10 inches, says Bros. It has an empty weight of 24,000 pounds, an overall body-and-tongue length of 26 feet 6 inches, an overall body width of 8 feet, and an overall height on tires of 7 feet 9 1/2 inches. The tires are 24-ply 18:00 x 24, and have a pressure of 50 psi with an empty roller, or 70 psi with a fully



C. & E. M. Photo
O. W. Michaelis, Carpenter Foreman of J. E. Latta Construction Co., has just finished making some check shots on the Telegraph Road overpass near St. Louis, Mo.

loaded one. Capacity of the tongue neck is 25 cubic feet or 187 gallons. Capacity of the body is 640 cubic feet.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 22.

Brushes in Many Styles

Fifty-six pages of information on brushes of all types make up a catalog issued by David Linzer & Sons, Inc., 10-20 Astor Place, New York 3, N. Y. Brushes described in the catalog include paint brushes in all sizes and styles, stucco brushes, masonry brushes, acid brushes, plasterers' brushes, stippling brushes, roof brushes, glue and paste brushes, stencil brushes, wire hand brushes, draftsmen's brushes, floor and push brooms, scrub brushes, engine-cleaning brushes, and others.

Each of these brushes is illustrated, and text explains its principal features. The catalog lists the sizes in which each brush can be supplied, the type of bristle used, style of handle, and so forth. It also contains information on the care of each type of brush, and on the guarantee covering Linzer brushes. The catalog is indexed for ready reference.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 5.

ON THE ROAD... AND ON THE JOB

You'll be Out Ahead
WITH
MICHIGAN



MODEL T6K — 3/4 Yd., 6-Ton

Michigan rubber tired truck shovels are famous for speed on the road and on the job. Designed as a unit, with a heavy frame built for the job. Plenty of power gives you 30 mph road speeds. Easy operating air valves control air ram clutches for speedy crowding, hoisting and a 5.5 rpm swing that means extra yardage.



MODEL TMDT-16 — 1 1/2 Yd., 10-Ton



MODEL C-16 — 1/2 Yd., 8-Ton

For those swampy jobs the model C-16 — balanced weight distribution — wide pads — low ground pressure — air controlled mechanism, travel and steering.



MODEL TLDT-20 — 1/2 Yd., 12-Ton



Get the complete details about the entire line of MICHIGAN Mobile SHOVELS-CRANES.

MICHIGAN POWER SHOVEL COMPANY
490 SECOND STREET • BENTON HARBOR, MICHIGAN



B-r-r-r. I'm just as c-cold as you are, m-mister. How's about s-some anti-freeze for me?

Winterized Tractors Winterproof Profits

Some Tips on How to Protect Your Tractors Against Winter Sabotage And Maintain Winter Job Schedules

† EACH year, winter weather sabotages the cooling systems of tractors not serviced and protected to resist it. So the Allis-Chalmers Tractor Service Department offers the following suggestions to contractors and highway officials who are anxious to maintain their



It's one sick tractor I am. About time somebody set that guy right on how to winterize me.

construction schedules in spite of inclement winter weather.

First of all, it advises, use a permanent, ethylene glycol anti-freeze solution in the cooling system of your tractor. Because it has a boiling point higher than 185 degrees F, you can keep your engine at a normal operating temperature of 160 to 185 degrees F without loss of solution. A mixture of three parts of permanent anti-freeze and two parts of water will provide maximum protection against freezing. The solution should be tested periodically to make sure it is strong enough to protect the tractor against prevailing temperatures.

The thermostat, which maintains the engine operating temperature at 160 to 185 degrees F, should be kept in good working order, and a new thermostat and gasket installed if needed.

If your tractor is equipped with a radiator shutter, use it to help maintain the proper engine operating tempera-

ture—or get a radiator curtain if you don't have the shutter. Good side plates are a great help in keeping the engine warm.

Winter Lubrication

When changing oil at temperature readings of 32 degrees F or below, use the SAE number recommended in the manufacturer's service manual. Frequently, oil that is too heavy in cold weather will cause such a drag on the starting motor that the engine will not start even though the battery is in excellent condition.

Fuels

The fuel used last summer may be a little heavy for winter operation. You need one with a pour point low enough to permit it to flow freely under the prevailing operating temperatures. For cold-weather operations it has been found that lighter fuels such as No. 1 diesel have a lower pour point; they also have a higher cetane number along with a low distillation end point. These are the fuel characteristics which determine easy starting and clean burning in winter. Your favorite oil man can fix you up.

After you get the proper fuel, keep it clean and don't forget to drain those sediment sumps under the fuel tank every night before you leave the tractor.

Batteries and Electrical System

All electrical connections and wiring need checking to see that they are in good condition. And be sure the generator is charging properly. Batteries are used much harder during the winter months and must be kept in good condition to prevent freezing. Here are some items to keep in mind: (1) The tops of batteries should be kept clean; (2) Electrolyte should cover cell plates; (3) Battery readings need checking at frequent intervals; (4) In temperatures below 32 degrees, the specific gravity reading should not be allowed to go below 1.250.

Prolonged Engine Idling

Prolonged idling during cold weather results in low engine temperature. This in turn may result in dilution of lubricating oil; lacquer or tar-like deposits on valves, pistons, and cylinder liners; and generally abnormal engine wear and poor performance.

When the engine is started, it should be brought up to proper operating tem-



Now, this is more like it. Temperature normal, oil and fuel just right—try and stop me, winter!

perature and maintained during the time the tractor is in operation.

A Few More Reminders

Don't forget to cover the exhaust pipe at night.

Clean the mud and snow out of the tracks and truck wheels and from the support rollers before leaving the tractor at night. Then park it on solid ground to keep it from freezing down. A lot of dirt and snow will fall off the tractor if you run it back and forth a few times in a cleared solid place.

Pre-Stressed Concrete

A bibliography on prestressed reinforced concrete has been prepared by the Engineering Societies Library. The work contains a list of 190 references to books and articles on this subject published during the past sixty years. It supplies annotated references covering all aspects of the subject including theory, design, and application.

Copies of "ESL Bibliography, No. 2" may be obtained by writing to the Engineering Societies Library at 29 W. 39th St., New York 18, N. Y. It costs \$4.00.

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Use these single acting jacks for safe, sure work in lifting, lowering, pushing or pulling. Double lever sockets speed work in cramped quarters and in angular lifting. All models will lift full capacity on the toe or on the cap—a feature that only Simplex can give you.

Available in 10 models with capacities ranging from 5 to 35 tons, and lift from 7 to 18 inches. All have two-way standard lever socket except three largest models; these are available with any of three types of sockets. Delivered with level included.

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16" - 18" - 24"
4 ply, 28-ounce Duck

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Will you just look at the heavy oil that dope's going to feed me. Ugh, what next?

Convention Calendar

Jan. 10-14—Materials Handling Show

Materials handling show, American Society of Mechanical Engineers and Materials Handling Institute, Convention Hall, Philadelphia, Pa., Clapp & Poliak, Inc., 350 Fifth Ave., New York 1, N. Y.

Jan. 16-20—AED Meeting

Annual meeting, Associated Equipment Distributors, Stevens Hotel, Chicago, Ill. Frank G. Knight, Executive Secretary, 360 N. Michigan Ave., Chicago 1, Ill.

Jan. 19-21—ASCE Meeting

Annual meeting, American Society of Civil Engineers, Commodore Hotel, New York City, N. Y. Don P. Reynolds, Assistant to the Secretary, 33 W. 39th St., New York 18, N. Y.

Jan. 24-26—Ohio Highway Conference

Sponsored jointly by Department of Civil Engineering of the Ohio State University, and The Ohio Department of Highways. Professor Emmett H. Karrer, Chairman, Conference Committee, Brown Hall, The Ohio State University, Columbus 10, Ohio.

Feb. 7-9—ARBA Meeting

Annual meeting, American Road Builders' Association, Mayflower, Statler, and Willard Hotels. Charles M. Upham, Engineer-Director, International Bldg., Washington 4, D. C.

Feb. 28-March 3—AGC Convention

Annual convention, Associated General Contractors of America, Inc., Waldorf-Astoria Hotel, New York, N. Y. H. E. Foreman, Managing Director, Munsey Bldg., Washington 4, D. C.

Truck Vibration Cut By Use of Shaft Box

A shaft box designed to absorb vibrations in trucks operating at high speeds has been developed by SKF Industries, Inc., P. O. Box 6731, Philadelphia, Pa. This unit is said to absorb vibrations caused by drive shafts revolving at high speeds, and to prevent their spread to the truck chassis. Reduced driver fatigue and maintenance costs result, SKF points out.

The device consists essentially of a housing whose outer and inner rings are separated by an oil-resistant rubber cushion, and a self-aligning ball bearing which is free to move lengthwise in the shaft box. According to the manufacturer, the cushion is built up by shooting the rubber substance between the rings at high velocity. The rubber is held in place by mechanical friction and there is no need for vulcanizing. A metal labyrinth seal protects the bearing against dirt, dust, and road splash.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 70.

Metallizing Co. Celebrates

Metallizing Engineering Co., Inc., of Long Island City, N. Y., recently celebrated the 15th anniversary of its founding in September, 1933. This company now owns and operates its own plant, employing about 125 people, where it makes its metal-spraying equipment—Metco-Weld H, Fusebond, Sprabond, Ruf-Tred, etc. Warehouses are maintained at Long Island City, Chicago, and Los Angeles. Sales and service offices are located in 25 cities.

Oil Seals for Bearings

The use of oil seals for bearing protection is the subject of a 40-page catalog prepared by The Garlock Packing Co. of Palmyra, N. Y. Two models of Garlock Klokzures are described in Bulletin AD-133—the Model 63 which is produced in a range of sizes up to and including a 3-inch shaft x 4.003-inch bore diameter; and the Model 53, produced in sizes upward from a 3-inch shaft x 4.125-inch bore diameter. These

two models supplement, but do not replace, the older Garlock Klokzures.

The catalog describes and illustrates the features of the Klokzures including the metal adapter, tempered springs, synthetic-composition element or sealing member, and the metal case. It includes installation instructions, telling how to prepare the Klokzure and the unit to receive it. A table of sizes lists each of the Klokzures in the 53 and 63 series, giving the part number, diameter of shaft, diameter of bore, and width.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 1.

Clutches, Power Take-Offs

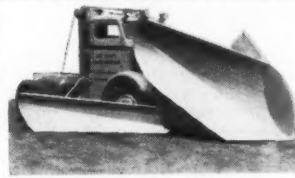
Literature on a line of clutches and power take-offs may be obtained from the Rockford Clutch Division of the Borg-Warner Corp., 314 Catherine St., Rockford, Ill. The catalog is of the loose-leaf type and contains bulletins on the 6-inch TS clutch; the 6, 6½, 8, 8½, 9, 10 and 11-inch RM clutches; the

10, 11, 12, and 14-inch TT spring-loaded clutches; the 3½, 4½, and 5½-inch LMC over-center clutches; the 4½ and 5½-inch LOC over-center clutches; the 8, 9, 10, 11, 12, 13, 14, 15, and 17-inch over-center clutches; the 11, 12, and 14-inch over-center clutches for use with flywheels without counterbore; the Pullmore multiple-disk clutches; Pullmore combination multiple-disk and jaw-drive clutches; the heavy-duty

gear-tooth-drive type of clutches and power take-offs; and others.

Each of these types is illustrated, its principal features explained, and its uses recommended. Line drawings show the dimensions of the various units, and text describes the springs, pressure, work ratios, capacities, and installation.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 4.



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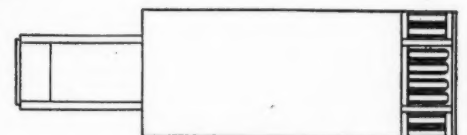
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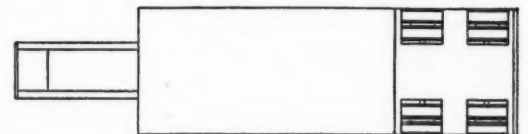
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MODERN

Designed

TRANSPORTATION

Avoid Legal Pitfalls

Edited by A. L. H. STREET, Attorney-at-Law

These brief abstracts of court decisions may aid you. Local ordinances or state laws may alter conditions in your community. If in doubt consult your own attorney.

Court Says Govt. Must Be Reasonable In Interpretation of Contract Clauses

Contractors made an accepted composite bid for grading a Government airfield. In doing so, they relied upon the Government's estimates of quantities to be excavated. Field, channel, and borrow excavation were separately estimated.

The contractors computed their bid first by figuring the cost of each type of excavation. The composite bid they finally made was 37.476 cents per cubic yard—more than the basic cost of field and borrow excavation but less than the estimated cost, 51.23 cents, for channel excavation.

While the work was in progress, the Government notified the contractors that the estimated 2,300,000 yards of borrow excavation would be reduced by 750,000 yards. A clause in the contract required the completion of the work at the contract price, "be the required quantities more or less than the amounts estimated". The Government, relying on this clause, denied the contractors' claim for additional compensation.

Were the contractors entitled to enforce an equitable adjustment of the contract price?

Contractors Entitled to Adjustment

The United States Court of Appeals, in an opinion filed November 3, 1947, said they were so entitled. (Peter Kiewit Sons' Co. v. United States, 74 Fed. Supp. 165.)

The court affirmed that both the Government and the plaintiffs believed, when they entered into the contract, that they could rely on a ratio of 1,000,000 cubic yards of channel excavation to 2,300,000 yards of borrow excavation. Therefore "the contract was not intended by the Government to be speculative, as the War Department Board of Contract Appeals said, but was perfectly capable of being computed and bid conservatively".

Since a composite bid was required, the court argued, a great variation in the ratio between the different kinds of excavation would be ruinous to the contractor. Or it would cause the Government to pay far more than the work was worth.

"We have no reason to suppose that the Government intends to make its contracts on any such irrational basis." The parties would not have made the contract which they did make unless they had believed that the estimated proportions of excavation would prove out in performance. As it happens, they were mistaken as to the facts. "Such a mistake calls for a reformation, in equity, of the contract."

Estimate or Guarantee?

The Government, in its argument, relied on Section 1.05 of the specifications—a section which is found in many Government contracts. This section declared that estimates made in invitations to bid for contracts which are to be paid for on a unit-price bid are only estimates—they are not guaranteed amounts.

But, said the court, Article 4 of the contract promises a modification of the contract to conform to unforeseen subsurface or latent conditions, or to unknown or unusual conditions. And Section 1.05, cited by the Government, was certainly not intended to cancel Article 4 out of the contract.

This Case V. Similar Ones

The court also distinguished this case from similar controversies it had decided. In each of those cases, it said, there was in the actual performance a large excess of units above the estimates. Furthermore, unlike this case, there was no question of a composite bid for two wholly different types of work—where the prerequisite to a rational bid would be

an approximately accurate estimate of the proportions of the two types of work.

Instead, the contractors in the former cases made improvident bids upon which they lost money—even on the smaller estimated amounts. And for that reason only, they desired not to increase their losses by performing additional units of work. They had expected to make a profit on the estimated number of units. And they would have made the same or perhaps a larger profit on a larger number of units. However, their bids had turned out to be too low to allow any profit at all.

Contractors in those cases—unlike the contractors in this case—could not say that they wouldn't have made the contract except on the assumption that the estimated amounts were approximately correct.

Motorist Injured on Road Relocation; \$5,000 Damages

THE PROBLEM: In the night a motorist and his car were precipitated into a creek on a highway that was being relocated, at a point where a new bridge was to be built. Traffic had been routed over an old bridge near-by that was to be superseded. From the point where the traveled way curved towards this old bridge, the new strip of road on which the accident occurred ran straight towards the gap across the creek. The state highway department had erected a warning sign too close to the creek bank to be useful, and there was none at the junction between the traveled way and the new road.

The motorist sustained broken teeth, cuts about the head, and a knee injury, and the car was damaged to the extent of \$950. Was the jury warranted in awarding him \$5,000 damages against the road contractors, who had nothing to do with building the new bridge?

THE ANSWER: Yes, decided the Arkansas Supreme Court. (Hill v. Whitney, 210 S. W. 2d 800.)

As to the location and sufficiency of the barricade, the Supreme Court noted that there was no light burning on it and that a motorist not familiar with the situation would drive 20 or 30 feet towards the precipice from the traveled way before reaching the barricade, which was only 6 feet from the creek bank.

As to the contractors' duty to maintain a suitable warning the opinion says:

"It is true the barricade was erected by the Highway Department and was restored by the Department after it had been knocked down. Nevertheless, we think it was the duty of appellants [the contractors], both as a matter of contract and of common-law obligation, to warn the traveling public of a hazard which they had created, and to use ordinary care to protect the public from the danger incident to this hazard. . . .

"Appellants were under no contract to relocate the bridge, but they had built the dump or roadway to the point where the new bridge was to be located, and their contract covered the work on both the north and south sides of the bridge. Paragraph No. 7.9 under which appellants were operating reads as follows:

"The Contractor shall provide, erect, and maintain all necessary barricades, suitable and sufficient red lights, danger signals, and signs, and take all necessary precautions for the protection of the work and safety of the public. Highways closed to traffic shall be protected by effective barricades on which shall be placed acceptable warning signs.

The Contractor shall provide and maintain acceptable warning and detour signs at all closures and intersections, directing the traffic around the closed portion or portions of the highway, so that the temporary detour route or routes shall be clearly indicated. All barricades and obstructions shall be illuminated at night and all lights shall be kept burning from sunset until sunrise."

"The only attempt to comply with this contractual and common-law duty was to erect the barricade referred to, but even this was not properly placed. . . ."

After deciding that the evidence was such that the jury could conclude that the contractors were negligent, the Supreme Court declared:

"A serious question in the case is whether appellee [plaintiff] was guilty of contributory negligence, but we are unable to say as a matter of law that he was. He had never traveled the road before except . . . in the opposite direction, and the situations at the opposite ends of the bridge were entirely different. He had crossed the bridge in safety, and no doubt thought he could safely recross it. There were no lights on the barricade and no signs or markers indicating its presence as one approached it, and appellee testified that he did not see it until he had passed the point in the road where he should have turned to the left to cross the bridge. He testified that he observed the road as he drove along and that he continued in what appeared to be the traveled portion thereof, and that as soon as he saw the barricade he applied his brakes but was unable to stop his car until he had run into the barricade, which was placed at the edge of the precipice. The Jury might well have found that appellee was guilty of contributory negligence, but we are unable to say as a matter of law that it could not find otherwise."

By Making No Objection, Builder in Effect Agreed

THE PROBLEM: An airport-construction contract reserved right in the Government to terminate it in whole or in part. In that event the contractor was to be paid for work done, plus a proportionate part of his profit.

During the job, ledge rock was unexpectedly encountered. Due to extra expense involved in excavating this rock, there was some likelihood that the project might be canceled for lack of funds. But the Government raised the grade to eliminate the need for excavating the rock. Some of the rock was restored to the contract by supplemental agreements under which the contractor was to be paid \$1.50 per cubic yard for excavating it. Later the company sued to recover on a basis of \$3.40 per yard. Was it entitled to collect the excess above \$1.50?

THE ANSWER: No, decided the United States Court of Claims. (John Arborio, Inc., v. United States, 76 Fed. Supp. 113.)

The court said that the construction company had manifested satisfaction with the change order—especially since the project might have been canceled due to the expense of removing the rock. The court noted that the contracting company did not protest nor appeal from the change order, but accepted it in writing, and added: "Under the decisions of this Court and of the Supreme Court, the ledge rock became effectively removed from the purview of the contract." So, acceptance of payment on the \$1.50 basis without protest barred claim for more pay. The court rejected a claim that the acceptance was coerced.

Rights Enforced Against Federal Contractor's Bond

THE PROBLEM: The Miller Act (40 U.S.C.A. Sec. 270b) sets forth the conditions under which a party who has no direct contractual relationship with a general Federal contractor is entitled to enforce rights on the latter's statutory bond rising out of contractual relationship with a subcontractor. The claimant must give "written notice to said contractor within 90 days" after performance of the last labor or furnishing of last material. The notice must state "with substantial accuracy the amount claimed and the name of the party to whom the labor or material was furnished. The notice may be served by registered mail or in the way that a summons is served."

Was the requirement for written notice sufficiently complied with where a materialman exhibited a written statement to a general contractor, showing the amount he claimed and the identity of the subcontractor to whom sand had been furnished?

THE ANSWER: Yes, decided the United States Circuit Court of Appeal, Fifth Circuit. (Coffee v. United States, 157 Fed. 2d, 968.) The statement was handed to the contractor, who held it in his hand, had full opportunity to examine it, and could have retained it had he so desired. The Court said:

"All the cases agree that without giving the notice there is no right of action on the bond for the use of furnishers who have no direct contractual relation to the contractor. In no case has writing been held unnecessary. But there has been liberality as to the manner of communicating the written notice to the contractor. We have held . . . that a letter from one who furnished materials to a subcontractor sent to the owner of the work, a copy of which was timely sent by the owner to the contractor by ordinary mail, was a good written notice." In a cited case decided by the United States Supreme Court "stress was laid on the remedial character of the Miller Act and its predecessor, and while a written notice was apparently deemed necessary as a condition precedent to suit, nevertheless the fact that it was addressed to the project engineer and not served by (Concluded on next page)

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Avoid Legal Pitfalls

(Continued from preceding page)

any one of the means mentioned in the statute" [by registered mail or in the way that a summons is served by the United States marshal] "was held immaterial since it in fact reached one of the two contractors."

In another case "we again emphasized the liberal construction due to be given the Miller Act to effectuate the Congressional intent to protect those who furnish labor and material for public works. In the case now before us we hold that a writing containing the information which the statute requires, exhibited to the contractor by the claimant as a notice of his claim and which the contractor examines and discusses and might have taken if he desired, is a written notice sufficiently served."

Highway Contractor Not Entitled to Overhaul Pay

THE PROBLEM: The necessity of detouring around an open bridge site caused longer haulage of crushed stone on a Government highway contract. The site was shown on contract drawings when bids were submitted. The contractor knew that the bridge had not been constructed and was not assured as to when it would be. Was he entitled to pay for the longer haul?

THE ANSWER: No, decided the United States Court of Claims. (First-Citizens Bank & Trust Co. v. United States, 76 Fed. Supp. 250.)

The court said that there was "no warranty inherent in the contract that such a bridge would be erected in time for plaintiff to use it in connection with his furnishing stone for surfacing."

Furthermore, the court said that had the contractor's claim been otherwise meritorious it was not allowable for want of proof of a basis for assessing damages.

The court cited in support of its conclusion a decision of the United States Supreme Court to this effect: The Government is not liable for delays in furnishing a site to a contract, when the contract is so worded as to imply the possibility of delays in coordinating the work done under independent contracts, and specifies procedure applicable to delays. (United States v. Howard P. Foley Co., 329 U.S. 64, 91 L. Ed. 44.)

Provisions of Contract To Be Read as a Whole

THE PROBLEM: A Government contract to construct an irrigation canal on a unit-price basis was not entirely clear in its provision for an "approach channel". The contractor assumed that the channel was to be constructed upstream from the station where the headworks proper terminated. The Government claimed that the provision included excavation of a channel into a river, which involved very expensive subaqueous rock excavation. The contractor did the work under protest, and his executrix sued for additional pay above the unit price of \$1.25 per cubic yard fixed by the contract. Was the Government liable for an additional \$15 on each cubic yard involved in the dispute?

THE ANSWER: Yes, decided the United States Court of Claims. (Orino v. United States, 77 Fed. Supp. 938.) The court said:

"It may be conceded that in its ordinary and accepted meaning the term 'approach channel', standing alone, denotes a channel from a source of supply capable of supplying the capacity of the structure which it serves to connect. However, we are not here dealing with the ordinary meaning of 'approach channel' but with what it meant in this contract. . . . For our present purposes, the meaning must be determined from the context in which the term is used, and from other portions of the contract documents wherein the work to be performed under the contract is specifically defined or otherwise indicated."

The court added that if there was any doubt as to the meaning of the contract documents in this regard, it should be resolved against the Government, whose representatives drew up the documents.

Government Held Liable On Wage-Increase Order

THE PROBLEM: Government ordinance-plant contractors were required by Government order to raise wages retroactively, under promise that they would be reimbursed for the resulting additional expense. The order was issued under mistake and the promise of reimbursement was unauthorized. Were the contractors entitled to reimbursement for increased wages which they paid?

THE ANSWER: Yes, decided the United States Court of Claims. (Winn-Senter Const. Co. v. United States, 75 Fed. Supp. 255.)

The court said: "The orders to pay the retroactive wages were made by agents of the Government pursuant to their reasonable interpretation of an order issued by the Chief of Engineers. For the plaintiffs, in the haste and confusion of building this war project, to have refused to obey them, as Mr. Justice Holmes suggested in the Morrisdale Coal Co. case . . . and thus to have brought down on their heads the reprisals of the several officials who spoke with the authority of the Contracting Officer, would have been unthinkable, and, we conclude, was not required of them. The law, as between the Government and those who deal with it, should be law that it is possible to live by, not merely law that reads plausibly in the books. We think that, in the circumstances, it is not unfair to hold the Government responsible for the costs of carrying out an order of the Chief of Engineers, though the order was given by mistake."

Owners Not Bound When Engineer Accepted Job

THE PROBLEM: A contract to pave the streets of a suburban subdivision empowered the owners' engineer to accept the completed work, releasing the contractor except as to guaranteed maintenance for 5 years. The guaranty covered defects due to deviations from the spec, which required expansion joints and a concrete base at least 5.40 inches thick. Expansion joints were omitted by the contractor and the bases averaged 5.24 inches. The engineer accepted the job. Were the owners liable for an unpaid portion of the contract price?

THE ANSWER: No, decided the Texas Court of Civil Appeals, Galveston. (Uvalde Rock Asphalt Co. v. Fantham, 210 S.W. 2d 646.)

The gist of the decision is as follows:

The contractor made out a prima-facie right to collect the full contract price by proving that the supervising engineer accepted the job. But the engineer had no power to accept the job if there was a substantial departure from the spec. By his own admission the engineer did not know whether the work had been done according to spec; therefore his acceptance was void as being arbitrary and capricious.

The omission of the expansion joints was necessarily intentional, and the deviation as to thickness of the concrete base was so great as to amount to a fraud against the owners.

Right to Premium Rebate When Insurance Is Void

THE PROBLEM: A partnership held Government construction contracts, and premiums which covered policies indemnifying against public liability and workmen's compensation liability were paid out of the partnership funds. But the policies named only one of the two partners as beneficiary, and there was no intention to insure the partnership, although the insured partner erroneously believed that the firm would be covered. Was the partnership entitled to recover the premiums so paid?

THE ANSWER: Yes, decided the Oklahoma Supreme Court. (Commercial Standard Insurance Co. v. Suttle, 193 Pac. 2d. 563.)

The Supreme Court rejected contentions of the insurance company that the company would have been bound to pay any loss that

might have occurred. Because the company had refused to insure the partnership, the court distinguished the case from situations where the same court had decided that a corporation could enforce a policy issued to a partnership which it succeeded, and that a partner succeeding to ownership of the firm's business could enforce a policy issued to the firm. The court followed this general rule: where money has been paid under a contract that, through mistake of law or fact, is unenforceable, it may be recovered as having been paid without consideration.

Rock-Crushing Plant As Personal Property

THE PROBLEM: A concrete-products company lost, under mortgage foreclosure, real estate on which it had operated a rock crusher. The new owner sold the rock crusher to plaintiff, later sold the land to other parties, and still later purported to sell the rock crusher to defendant. Who got legal title to the plant?

THE ANSWER: Plaintiff, decided the Oregon Supreme Court. (Kelley v. Ness, 189 Pac. 2d 570.)

The court decided that the new owners of the land, who bought from the purchaser at the mortgage foreclosure sale, became mere custodians of the plant; and that defendant got no title to the plant, because the party who purported to sell it to him had previously conveyed the title to plaintiff.

The court reaffirmed the rule of law: "Mere possession of another man's property affords no evidence that the person having such possession has power to sell it, and he who purchases or intermeddles with it must see to it that he is protected by the authority of one who has power to sell."

Due to Delayed Notice To Proceed, Job Costs Rise

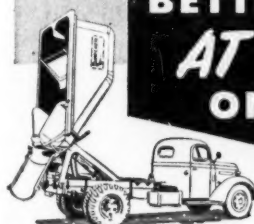
THE PROBLEM: A contract to landscape a housing project provided for notifying the contractor to proceed when one or more sections of the superstructure had been completed. But the contractor induced the Government to withhold the notice until the entire superstructure was completed. Completion was delayed without fault of the Government. Was the Government liable for resulting increase of the cost of performance by the landscaper, due to rise in material and labor costs?

THE ANSWER: No, decided the United States Court of Claims. (Stafford v. United States, 74 Fed. Supp. 155.)

The court deplored the hardship suffered by the contractor through reliance upon stability of labor and material costs. But it observed that the Government's representatives "were not required to be more astute than the contractor himself in estimating when the site would actually be ready for plaintiff, nor in anticipating what changes might occur in the meantime."

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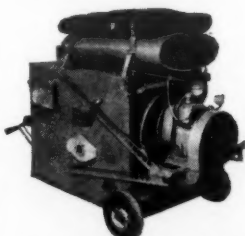
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Contractor O'Keefe keeps haul roads well maintained to take full advantage of C Tournapulls' 17.3 m.p.h. speeds. Powerful, disc-type air brakes enabled operators to use top speed with complete safety.

John O'Keefe handles 600,000 yds. with 5 TOURNAPULLS

John O'Keefe, De Pere, Wisconsin contractor is using 5 high-speed, rubber-tired Tournapulls to speed completion of a new Wis.-Minn. Bridge Approach on U.S. 12 near Hudson, Wis. Job calls for borrowing blow sand from a cut at top of bluff . . . then drifting material into river at end of fill.

Modernizes Tournapull fleet with 2 electric rigs

To cut costs in the abrasive blow sand and assure high-speed production, O'Keefe put 3 of his veteran rubber-tired Super C Tournapulls on the job . . . then added 2 new electric-control C Tournapulls to his fleet. "These new Tournapulls beat anything built yet," said Foreman Bob O'Keefe. You'll see why, when you take a look at their performance record.

Deliver 10 loads an hour on 5,000' round trip

Loading down grade, O'Keefe's electric-control Tournapulls get 11 pay yards of blow sand in 75' . . . high-balled it to the fill . . . spread their loads and returned to top of cut every 6 minutes. That's 10 trips an hour per rig on the difficult 5000' cycle. Instant speed selection gave fast acceleration to 17.3 m.p.h. Constant-mesh transmission eliminated gear-shifting delays throughout cycle for higher average speeds. Giant 21.00 x 25 low-pressure tires, plus power-proportioning differential, kept C's from digging in on soft spots.

Like Contractor O'Keefe, a LeTourneau user since 1936, you'll find it pays to modernize your fleet with these new electric-control Tournapulls. Their production performance will amaze you. Ask your LeTourneau Distributor to estimate production and savings possible on your job. CALL HIM TODAY!

Tournapull—Trademark Reg. U.S. Pat. Off. C99-a



To speed loading in the loose blow sand, Tournapulls were push-loaded down-grade . . . obtained 11 pay yards in 33 seconds. Loading distance averaged 75 feet.



At river end of fill Tournapulls spread their loads in 18 seconds . . . then made sharp 90° positive power steer turns. Their constant-power pull through Tournamatic differential gave plenty of traction in the soft, loose blow sand.



Tournapulls climb grades as high as 12% to top of cut. Operators find it easy to maintain fast schedule because non-stop speed selection eliminates gear shifting delays, permits use of faster gear combinations.

LETOURNEAU



TOURNAPULLS

MORE YARDAGE PER HOUR WITH RUBBER-TIRED POWER